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LOWER California is enjoying a "rush," it being reported that extensive gold placer ore-deposits have been discovered.

MR. J. S. PHILLIPS, mining engineer and metallurgist, has changed his headquarters to 52 State street, this city.

THE Chicago National Exposition of Railway Appliances was opened on the 24th with appropriate ceremonies. Among those who spoke were the venerable HORATIO ALLEN, who brought over from England the "Stourbridge Lion," and JOSEPH WHITEHEAD, who was fireman on the "Stockton" in 1827.

IN spite of the steady decline in the price of lead in Europe, the Mechernich mine, of Germany, the greatest in the world, has again paid a good dividend to its shareholders. The production in 1882 was 25,054 metric tons of lead and 5108 kilograms of silver, yielding a gross profit of 2,256,726·89 marks, and leaving, after writing off 879,559·43 marks, a net profit of 1,380,050·16 marks, out of which a dividend of 13 per cent on a hare capital of 9,600,000 marks was paid.

THE annual convention of the American Society of Civil Engineers will be held at St. Paul and Minneapolis, Minn., beginning June 19th. The programme has not yet been fully worked out ; but four sessions are arranged for, and a number of visits to points of interest as well as a banquet tendered by the citizens of St. Paul and Minneapolis are on the *tapis*. The society, in order to accommodate members visiting the Chicago Exposition of Railway Appliances, will establish a headquarters there during the week beginning June 11th.

THE coke trade is now going through the reaction which an enormous development in the production, on the one hand, and a rapid shrinking in the demand, on the other, have made inevitable. According to the data given in the Census Compendium, Pennsylvania produced, in the fiscal year 2,317,148 tons of coke from 4,360,110 tons of coal. In 1882, according to the returns collected by the Secretary of Internal Affairs of Pennsylvania, 10,063 ovens in that State yielded 3,216,543 tons of coke. Beginning, in 1882, with an active demand in the great Connellsville region, prices at the oven ranged between $1.70 and $1.75. In June of that year, it fell off to $1.40 to $1.50, and, in September, the price reached $1.15 to $1.25. Rallying after the settlement of the troubles in the iron trade, it moved along steadily till the close of the year at $1.30 to $1.35 ; but the beginning of the present year witnessed a sudden decline to $1.20 to $1.25, and the cutting of rates continued during the month, February opening with $1.15 ; and during the month, coke was obtainable by close buyers for $1 per ton on cars at oven. Transactions based on $1 to $1.10 were made during March, and the reduction of freights toward the close of April did not improve matters perceptibly. Cutting began again in May, and now sales as low as 90 cents are reported. The coke-makers are getting alarmed, and propose to take steps toward restriction and the scaling down of wages.

THE Cleveland meeting of the American Society of Mechanical Engineers will begin on Tuesday, June 12th, with a session at which the Civil Engineers' Club of Cleveland will be present. The second day will be devoted entirely to the reading of papers, among which the following have already been announced : History of the Winding and Pumping Engines of the Anthracite Regions ; Balancing Vertical Engines ; the Marine Engines of the Lakes, with a Device for getting them off their Dead-Centers, by J. F. HOLLOWAY ; the Bower-Barff Process, by W. F. DURFEE ; Ingot Cranes, by G. CURTIS ; Spiral Springs, by OBERLIN SMITH ; and Steamboat Pipe Fittings, by W. J. BALDWIN. The society will on Thursday visit the works of the Otis Iron and Steel Company, the Cleveland City Forge and Iron Company, the Union Screw Company, Brush Electric Light Company, Cleveland Rolling-Mill Company, Standard Oil Company, Warner & Swasey's, and Cleveland Malleable Iron Company.

This is the first time the society has ventured on its travels, all former meetings having been held in Eastern cities. We feel confindent that the society will not regret having followed the hearty and urgent invitation which came from the Western engineers, through Mr. J. F. HOLLOWAY, who we notice is chairman of the local committee. The programme is a tempting one, and will no doubt contribute largely toward increasing the field of utility of the youngest of the three great technical societies in the United States.

THE reports for the three great pyrites mines, the Rio Tinto and the Tharsis in Spain, and the San Domingos in Portugal, have been published The Rio Tinto, mining an ore which, as coming from the mine, yielded on an average 2·805 per cent by wet assay, sold 272,826 tons of pyrites, carrying an average of 2·448 per cent by dry assay, and made 9740 tons of metallic copper. The profit was £738,308, £477,183 being available for dividends. In its roasting-heaps, the company has from 40,000 to 50,000 tons of copper. The company has a tunnel 7546 feet long, connecting the northern and southern workings, and the width of the ore for the entire distance is estimated to average from 160 to 200 feet, the hight above the tunnel level being from 200 to 230 feet. Explorations 230 feet below that level have proved the deposit with a width of 300 feet at that depth. This enormous block of ground is estimated to contain net from twenty to thirty millions of ore above the tunnel level in the southern part of the property, and the workings are now in such shape that the production of ore can be increased to from 1,250,000 to 1,300,000 tons annually, equivalent to about 40,000 tons of copper.

The Mason & Barry, or San Domingos mines, in Portugal, with a capital of upward of £1,200,000, yielded a profit of £276,719 ; while the Tharsis, as already noted, wound up the year's business with profits aggregating £335,676, making the total for the three mines £1,089,578, or about $5,263,000.

It may be of interest to metallurgists to state that the Mason & Barry Company is building works at Raniham, Essex, to make trials with a mechanical roasting-furnace, "with a view to placing before the manufacturers in England and America the actual commercial results."

OFFICIAL STATEMENTS AND REPORTS.

THE AMERICAN FERRO-MANGANESE AND IRON COMPANY.

A prospectus has been issued by this new company, organized under the laws of Georgia, which contains statements bearing upon the possibility of profitably manufacturing ferro-manganese in the South. With an abundant and cheap supply of ore, costing at the furnace not more than $5, and with access to fuel through the rapid extension of railroads into the coal-fields of Alabama, 75 miles from the ore-deposits, it is expected that works in Georgia will be able to supply at least a portion of the demand in this country. The chief promotor of the company is a gentleman who has had much experience in manufacturing ferro-manganese and spiegeleisen. At present, it is proposed to work three thousand tons of manganese ore, which will produce about twelve hundred tons of high-grade (from 60 to 70 per cent) ferro-manganese, the company leasing for the purpose of this work a first-class modern furnace supplied with all the adjuncts before mentioned. As there is no such furnace to be had for lease near the manganese ore-deposits, the company will be compelled to take one at a distance, and the cost of freight to it can be deducted in estimating what can be done later on. Such a furnace can be leased in a location to which the freight on the ore will be about five dollars per ton, making the ore delivered at the furnace cost ten dollars per ton. In that locality, coke costs from ten to ten and a half cents per bushel, so we estimate as follows for the experimental run of ferro-manganese produced:

2½ tons ore at $10	$25.00
150 bushels of coke at 10½ cents	15.75
1 ton limestone	1.00
Labor and superintendence	6.00
Lease of furnace	4.00
	$51.75

The present price of this article is, as before stated, $78 per ton. The company would then offer its product to the steel manufacturers at a much reduced price, as it could well afford to do, say at $65 per ton, bringing the cost of the unit of manganese under the price of the same unit in the shape of spiegeleisen.

THE BROOKLYN BRIDGE.

The opening to traffic this week, with much festivity, of Brooklyn's and New York's great engineering undertaking, the bridge, furnishes a fitting occasion for briefly reviewing its history and presenting a few data on the method of construction.

For years before the enterprise which has now been brought to a successful issue, the idea of uniting Brooklyn and New York by means of a tunnel or a bridge was repeatedly brought forward. In 1860, Mr. John A. Roebling, the builder of the Niagara and Cincinnati suspension bridges, was called upon to make an estimate of the cost of the bridge; but this first effort to organize a company and build the bridge failed, and it was not until the beginning of 1867 that an act was introduced incorporating the New York Bridge Company, which became a law on April 16th, 1867. Among other powers conferred, it authorized the cities of New York and Brooklyn to subscribe to the capital stock (which was fixed at $5,000,000, with power of increase) such amounts as two thirds of their common councils respectively should determine, and to issue bonds in payment of such subscriptions. Under these provisions, Brooklyn subscribed for $3,000,000 of stock, New York $1,500,000, while the remaining $500,000 was distributed among the incorporators. These latter constituted the first Board of Directors, and by them Senator Murphy was elected President; Mr. John H. Prentice, Treasurer; and Mr. Orestes P. Quintard, Secretary. On the 23d of May, 1867, the elder Roebling was employed as chief-engineer. His plans, submitted to the directors on the 1st of September following, fixed the cost of the bridge at $7,000,000, exclusive of the land required (an item itself amounting to $3,800,000), and the time of building at about five years. Modifications of these plans and changes and improvements of one kind and another have greatly added to these figures. In 1872, his son, Col. W. A. Roebling, having succeeded to his father's position as engineer-in-chief of this work, and the hight of the bridge having been reduced from 200 to the maximum hight of 135 feet, estimated the cost at $9,500,000. In 1873, when the estimated cost of the land was added, the total cost of the bridge was raised to $13,045,065, and in 1875 to $13,145,065. The act of 1875, however, provided that the interest on the bonds to be issued by the two cities should be paid by the trustees out of the money received by them, and this added $1,500,000 more to the cost. Then the structure was increased in strength over the original plans of the engineers, and that added considerably more to the cost. About $15,000,000 have been expended on the bridge now, and the total cost, when all improvements are made at the approaches and the arches are fitted up for warehouses, will not be much short of $16,000,000. The yearly cost of maintaining the bridge, including interest on the bonds, will be about $800,000.

In March, 1869, at the request of Mr. Roebling, a board of consulting engineers was convened to examine his plans and report upon their feasibility. Its members were Engineers Adams, McAlpine, Allen, Latrobe, Kirkwood, Steele, and Serrell, and the result of their inspection was an indorsement of all he had done. So much had been said about the obstruction to navigation which would be offered by the bridge that Congress directed a still further examination of the plans, and Secretary of War Rawlins appointed General Newton, General Wright, and Major King, three government engineers, for that purpose. They recommended an increase in the hight of the bridge of five feet, but otherwise gave the plans their approval. In accordance with this recommendation, changes were made in the proposed method of building the roadway, so that the span midway between the two towers is now 135 feet above high-water mark. At the same time, the bridge was widened from 80 to 85 feet. Mr. Roebling lived but a few months after the appointment of the government commission. In the summer of that year, while standing upon the rack of one of the slips of the Fulton ferry, directing the details of a survey, the shock of an incoming ferry-boat caused him to lose his balance, and one of his feet was terribly crushed between the heavy timbers that formed the rack. The injury resulted in lockjaw, from which he died sixteen days afterward. His son, Col. Washington A. Roebling, who had aided in drawing the original plans, was appointed his successor. The caisson disease made the son one of its victims within a twelvemonth. Although his physical health has been impaired to such an extent that he is a confirmed invalid, his mental faculties have retained their vigor, and during all these long years he has directed the work from an upper room in his residence on Columbia Hights, in Brooklyn.

The erection of the bridge proper began January 3d, 1870, when the work of preparing a place for the foundation of the Brooklyn tower was commenced by tearing out the spare slips of Fulton ferry. During the next four years, the history of the bridge was marred by complaints of fraud. Matters reached that point finally that an Investigating Committee of Fifty went to work upon the accounts and all the records of the directors. In the early part of 1873, they presented their report. This indicated very clearly that there had been laxity in the management, and that the interests of the two heaviest stockholders—the cities of New York and Brooklyn—had not been protected as they ought to have been. The pressure of public opinion was so great that Mr. Kingsley, on the 1st of June, 1873, felt constrained to resign his position as General Superintendent. The Legislature of the following year took the matter in hand, and passed a law investing the authorities of the two cities with power to go on and complete the structure, first extinguishing the title of the private stockholders by purchasing their shares in the new company and reimbursing them in full. Under the new order of things, the bridge became public property, Brooklyn paying for and owning 66⅔ per cent, and New York 33⅓ per cent.

A table of dimensions and of dates that will prove interesting in connection with this great bridge is the following:

Length of river span, 1595 feet 6 inches.
Length of each land span, 930 feet.
Full width of bridge flooring, 85 feet.
Hight of river span above water, 135 feet 6 inches.
Size of New York caisson, 172 by 102 feet.
Size of Brooklyn caisson, 168 by 102 feet.
Cubic yards of masonry in New York tower, 46,945.
Cubic yards of masonry in Brooklyn tower, 38,214.
Length of New York approach, 1562 feet 6 inches.
Length of Brooklyn approach, 971 feet.
Depth of New York foundations below high water, 78 feet 6 inches.
Depth of Brooklyn foundations below high water, 44 feet 6 inches.
Size of towers at high-water mark, 140 by 59 feet.
Size of towers at the top, 136 by 53 feet.
Total hight above high water, 271 feet 6 inches.
Hight of roadway at towers, 119 feet.
Hight of arches above roadway, 117 feet.
Hight of towers above roadway, 159 feet.
Width of openings through towers, 33 feet 9 inches.
Weight of each anchorage, 60,000 tons.
Size of anchorages at base, 129 by 119 feet.
Size of anchorages at top, 117 by 104 feet.
Their hight in front, 85 feet.
Their hight in rear, 80 feet.
Grade of roadway, 3¼ feet in 100.
Number of cables, 4.
Diameter of cables. 15¼ inches.
Length of each cable, 3578 feet 6 inches.
Miles of wrapping wire on each cable, 243 miles 943 feet.
Number of wires in each cable, 5282.
Number of suspenders from each cable, main span, 208.
Number of suspenders from each cable, land span, 86.
Number of post bands, each land span, one cable, 35.
Strength of a single suspender, 140,000 pounds.
Sustaining power of each cable, 12,000 tons.
Greatest weight on a single suspender, 20,000 pounds.
Greatest weight on a single cable, 3000 tons.
Number of overfloor stays, 432.
Total length of wire in each cable, 3515 miles.
Greatest length of cable wire run in one day, 88 3-5 miles.
First wire rope stretched over the river, August 14th, 1876.
River first crossed on a wire rope, August 25th, 1876.
Foot-bridge finished and crossed, February 9th, 1877.
First cable wire run over and regulated in the elevated position for strand making, May 29th, 1877.
Cable-making fairly commenced, June 11th, 1877.
Last cable wire run over, October 5th, 1878.

The first caisson was built for use on the Brooklyn side. It was 172 feet in length, 102 feet in width, and 22 feet in hight. Its top was 15 feet in thickness, being composed of layer after layer of solid yellow pine timbers, each a foot in thickness, crossing one another at right angles, and all bolted together in the most compact manner. The four sides of the caisson were 9 feet 6 inches in hight and 8 feet in thickness where they joined the top, and like the latter, were built of stanch timber bound together with similar heavy bolts. The sides tapered off in thickness, somewhat like the letter V, and at their bottom (corresponding to the point of the V) they were only about eight inches thick. An iron casting was bolted over this thin edge, in order to afford it strength and protection. The interior of this caisson was divided into six compartments by timber partitions two feet thick, strong and well braced. Through each partition were two openings high and broad enough to permit of the passage of a man with a wheelbarrow. All the inside joints of the caisson were well calked with oakum and pitched, to prevent the escape of air. A sheathing of tin was laid over the outside by the caisson to protect the timber from the attacks of sea-worms, and as a still further means of excluding water. Over this sheathing was a layer of three-inch planks saturated with creosote. Such were the precautions taken to insure an air-tight caisson and to guard against its decay. The spare ferry slip having been demolished, dredging to the depth of 18 feet was necessary. Into this berth the caisson was towed on the 2d of May, 1870, and the work of sinking it began. Around three sides of the berth was built a coffer-dam. The side next the water was similarly protected after the caisson had been floated into position. Derricks were erected, and, on the 15th of June, blocks of granite from the Maine quarries were

hoisted upon the top of the caisson for facing, the bulk of the masonry being made of Kingston blue limestone. Under their weight, the caisson began to settle. When the weight upon the caisson was such that its iron-shod edges rested fairly on the river bottom, compressed air was turned into it, the water was expelled, and workmen went down underneath with pick, shovel, and wheelbarrow to commence excavation. Water-locks and Morris & Cummings's dredges were used to receive the material. An air-lock furnished the means of ingress and egress, and into this on the afternoon of May 10th, 1870, Colonel Roebling, Engineer Martin, and Master Mechanic Farrington entered. Groping their way into the subterranean chamber into which the air-lock opened, the three men spent twenty minutes in an examination, but were glad to beat a retreat at the end of that time, gasping for breath and half roasted by the intense heat. Water was turned in, the atmosphere of the chamber was cooled off, and, preparations having been completed, men were sent down to begin excavations in earnest on the 10th of July following.

Two memorable events occurred in the sinking of this caisson. One was a blow-out, caused by the neglect of the watchman inside the caisson. The compressed air made its escape and a torrent of water and mud belched out from beneath the sides. The muddy column rose to a great hight. The superincumbent weight upon the caisson at this time was about 17,000 tons. The result of this sudden withdrawal of the support of the compressed air was a settlement of the whole mass—caisson and masonry—ten inches, a crushing of the shoe in some places, and a settlement in the center of the roof of about four inches. These damages were repaired after a considerable expenditure of time, labor, and money. The fire that was discovered in the caisson on the 20th of December, 1870, was far more destructive. One of the laborers had carelessly placed his lighted candle near a joint in the roof. A fire was communicated to the interior of the timber work, which burned over a space 50 feet square. The first indication of its presence was the discovery of a charred hole the size of a man's fist near the joint where the candle had been carelessly placed. It was never known how long the fire had been silently eating its course through the timber. Carbonic-acid gas, water, and steam were turned into this hole in the hope of extinguishing it. Auger-holes bored upward into the roof revealed the fact that the fire was still at work. In his anxiety at this threatening danger, Colonel Roebling entered the caisson, where he remained for seven hours. He was partially paralyzed the next morning. The result of that night's labors in the caisson are seen in his shattered health to-day. Flooding the caisson with water was the last resort. In five and a half hours, the caisson was filled with water. Nearly three months were consumed in making repairs to the caisson. When the work of sinking to the requisite depth had been completed, the interior of the caisson was filled with hydraulic concrete, the whole hardening and affording as compact a foundation as bed-rock itself. Upon it was reared the Brooklyn tower, with its symmetrical gothic arches and its cap-stones, 271 feet 6 inches above high-water mark. The sinking of the New York caisson was doubly tedious and troublesome. Nearly twice the depth had to be reached, the air pressure was greater in consequence, and its effects more disastrous upon the workmen. The experience already gained was valuable. All danger of fire, for instance, was averted by having the caisson lined with boiler-iron. The cost of this was $20,000. The cost of the great fire in the Brooklyn caisson was exactly three fourths of that sum. The Brooklyn caisson rested upon its bed of rock March 11th, 1871, and the New York caisson in May, 1872, the sinking of the latter having required less than a year's work. The construction of the two towers above the water-line was simple enough after the caisson had been laid. The Brooklyn tower was completed in May, 1875, and the New York tower in July, 1876. The latter imposes a weight of 90,000 tons of masonry upon its timber foundations, against 70,000 tons in the Brooklyn tower.

Next to the towers in importance are the two anchorages, massive piles of stone weighing 60,000 tons each, and situated 930 feet from the bottom of each tower. Their purpose is two-fold. They not only hold the ends of the cables securely, but they also form a part of the approaches to the suspended floor of the bridge proper. To economize material and labor, they were built, not of solid masonry, but with arched passageways running through them lengthwise. Their dimensions are 132 feet in length, 119 feet in width, and 90 feet in hight. Gradually diminishing in bulk, at the top they are 117 feet in length, 104 feet in width, and 80 feet in hight at the land ends. Work was begun on the Brooklyn anchorage in February, 1873. At the bottom of an excavation which had been extended below tide level were laid three courses of yellow pine timber, each stick being 12 inches wide and 12 inches in thickness. Being laid in water sources, they will always be covered and saturated with water; and thus protected from atmospheric changes, they can never decay. Upon this flooring was erected the superstructure of limestone and granite. Deeply imbedded in this mass of masonry are the four anchor plates (one for each cable), immense iron castings with arms like a star, each plate weighing 23 tons. They measure 16½ by 17½ feet on the face and are 2½ feet thick at the center. Riveted to the anchor plates are the wrought-iron anchor bars, which are nothing more than the links in a chain of iron extending to the top, where they receive the ends of the bridge cables. A "shoe" is the connecting link between the anchor bars and the cables. Around this shoe are wound the wires which compose the cables. After the cables were laid, several layers of granite were placed in position above the shoes. Chambers were left in the masonry, however, to enable the engineers at any time to inspect the shoes and determine the condition of the wires. It is estimated that the anchorages will stand ten times the strain that can ever be brought to bear upon them. On the other hand, an estimate of the strength of the four cables satisfies the engineers that one of the anchorages could be suspended from them without causing them to break. The New York anchorage is similar to the Brooklyn anchorage. More difficulty was encountered in building it; for it is on made ground at an outskirt of the region known as "the Swamp." In excavating for its foundation, the tide-water soaked into the pit so rapidly that engines with a capacity for pumping 600 gallons a minute were employed in freeing the excavation of water. With much labor, a foundation of piles was laid, and upon this was erected the superstructure.

The elder Roebling's plans provided for iron approaches, in the form of trestle-work, resting on piers of masonry. The change in the plans has resulted in a more solid structure and in one of the finest viaducts of modern times. The New York approach particularly is admired for its symmetry and the magnificent curves of its arches. Between Chatham street to the anchorage—a distance of 1562 feet 6 inches—seven streets are crossed, all of them by stone arches, except Pearl and Cherry streets. Across Pearl street, at Franklin square, has been thrown a substantial iron bridge, to which, in due time, will probably extend stairs leading from the elevated station beneath. At the Chatham street end of the approach, an iron building is erecting, so planned as to receive, if it is ever desired to use it for this purpose, cars directly from the elevated railroad. The Brooklyn approach is 971 feet in length, beginning at Sands street. The grade to the anchorage is easy enough for the heaviest team, being only 2 feet 9 inches in every 100 feet. Prospect, Main, and York streets are each spanned with an iron bridge. A building of iron and glass, to be used for railroad purposes, is situated near the Sands street end of the approach.

When the towers and anchorages were completed, the work of spanning the river with the cables was begun. On the 14th of August, 1876, a wire rope, three quarters of an inch in diameter, was drawn up the water-front of the Brooklyn tower, passed over its top, and let down again on the opposite side, where its end was seized and carried over the houses to the anchorage. The other end of this rope was placed on a scow, and, at a time when there was no passing craft in the river, this was towed to the New York shore, the rope being paid out into the river just as an ocean cable is laid. Then the rope was drawn up over the tower and carried back to the New York anchorage and fastened. By means of powerful engines, this rope, nearly a mile in length, was stretched to the required degree of tension, and the first link of steel was laid between the two cities. A second rope was extended the same day, and their ends were united around driving-wheels. The endless rope thus formed served as a traveler to carry other ropes and wires across, running in cast-iron sheaves on the tops of the towers. As many journeys would have to be taken by the workmen on this traveler, Mr. E. F. Farrington, the master mechanic, decided to show his workmen how easily it was done and to inspire them with courage by an example. A boatswain's buggy, with ropes from its four corners fastened to an iron ring overhead, was rigged up and attached to the traveler. In this frail seat Mr. Farrington seated himself on the afternoon of August 25th, 1876. At a given signal, the drums were started, and the adventurous voyager began his trip from anchorage to anchorage, starting from the Brooklyn shore. He was whirled over the tops of the houses and the river with amazing rapidity. Workmen stood ready to assist him on the tops of the towers, and having reached the New York anchorage, he turned around and sped back again. Exactly twenty-two minutes had been occupied in making the journey. Another endless rope was stretched between the anchorages after this, and then a heavier wire rope, known as a carrier. By means of these, the three small cables for supporting the cradles, in which the work of building the main cables was to be carried on, were put across and secured in their places over the tops of the towers. Then came the foot-bridge from anchorage to anchorage over the tops of the towers, with wooden slats for its bottom and nothing but a steel wire on either side to serve as a hand-rail.

The laying of the cables fairly began June 11th, 1877, and the last wire was run over the river October 15th, 1878. Sheds had been put up on top of the Brooklyn anchorage, and all the machinery was placed there. Eight enormous drums were put up for each cable. On each, 10 miles of wire were wound, making 300 miles in all. The wire, which was made of steel and then galvanized, had been dipped in linseed-oil several times until it was well coated. No. 7 was used, the thickness being a little over one eighth of an inch. As it was wound on the drums, the end of one coil was fastened to that of the next by a steel ferrule, which had inside screw-threads to match those cut in the ends of the wire. At the ends of the cables, the wires had to pass shoes which were to be fastened to the anchor chains, and these were put above their places while the wire was run around them, and then they were lowered and made fast. The wire, with one end fast to the shore, was put over a sheave or wheel which was attached to the traveling rope, and it carried the turn of the wire across the river, making two strands. On the New York side, the turn of the wire was put over another shoe. Another sheave carried over two strands more, and so in each cable, wire after wire was carried across until each strand was completed. The sheaves were sent back empty to start anew. Each separate wire had to be regulated to its proper place by men on the tops of the towers and in cradles, the proper catenarian curve being kept after the first one was made right. For each strand 139 circuits of wire were run out, making 278 wires. The strand was then bound tightly every fifteen inches of its length, and formed a rope three inches in diameter. At the ends it passed around the shoe or eye-piece, which was fixed, as soon as the strand was done, in its place between the ends of two anchor bars, and held in place by a seven-inch bolt. It took about half an hour to lay and regulate each circuit of wire if no delay was caused. But great obstacles were met with in the force of the wind and in the unusual expansion caused by the sun's rays, and storms and cold weather caused many delays. All the wire was galvanized, and then it received five coats of oil, to prevent any rusting where the galvanizing might get off. These were the first cables ever made of galvanized steel wire. Each joint where the wires are screwed together, was also galvanized. The wire was run out to its place at a speed of 11 or 12 feet a second. On the top of the towers, the cable strands were laid in saddles, one to each cable. Iron rollers were placed in position near by, and over these the wires first passed before being laid in the saddle. Any strain on the cables causing them to deflect at one part makes them move in the saddles, while the rollers take up the strain and prevent any wrenching of the masonry of the tower. Each of the four cables having received its allotted 19 strands, the work of binding them together and wrapping them with wire into a compact cylindrical form was next undertaken. All the temporary wrappings were removed, so that the strands were no longer separate, their wires being brought loosely together. With clamps and squeezers and wooden mallets the one-eighth-inch wires were finally compressed together, and then securely bound in that position by the permanent wrapping of steel wire. Each cable was then painted with white lead and oil, and for miles they could be seen glistening in the sunlight of any fair day. Each cable was 15¾ inches in diameter, or nearly 50 inches around. A remarkable accident happened in connection with the running of the wire on the

19th of June, 1878. One of the great strands broke loose from the New York anchorage, carrying with it the immense iron "shoe" and its ponderous attachments. The shoe left the anchorage with a "whiz," killing two men outright, and took a frightful leap of 900 feet over the tops of houses and streets to the foot of the tower. It rested there for only an instant. The weight of the quarter-mile of wire in the river span jerked it like lightning up the side of the tower, over its top and far into the river, where it quickly disappeared to the bottom. Three of the bridge workmen were seriously injured by this accident.

Following the completion of the cables came the fastening of the suspender bands to them at intervals of 7½ feet throughout their entire length from anchorage to anchorage. These bands were of wrought-iron five inches in width and five eighths of an inch in thickness. They were curved to fit round the cables, and the ends terminate in projections. The band was first heated until it could be opened far enough to go over the cable; and after they were in place, they were drawn together by a bolt which also held the suspender socket. When the bands were all in place, the suspender ropes were attached to them. These suspenders are steel ropes varying in length from 170 feet close to the towers to 3 feet in the middle of the central span. They are fastened by sockets to the suspender bands, and at the lower end is a stirrup-rod to hold the floor-beam in its place. The top of each suspender is fastened in the socket attached to the band by pins driven between the wires, and then the whole is filled with melted lead. The ends of the wires are turned over in riveting. Each suspender was tested to sustain 100 tons, and the extreme weight which will come upon each will be only 10 tons.

The suspension of the steel roadway from the suspenders was the closing piece of work in this great enterprise. Its weight when finally completed was 6740 tons. Some idea of the weight imposed upon the bridge can now be formed. The cables weigh 3460 tons, the suspenders 1180 tons, the timber flooring 2760 tons, and the steel rails for the car tracks 660 tons, making the total permanent weight of the bridge 14,680 tons. A load of 3100 tons can be placed upon it with perfect safety, but it is estimated that the maximum weight of moving passengers and vehicles which can be crowded on it is 1380 tons. In general terms, the roadway which has been thrown open to the public this week consists of a steel frame-work 85 feet in width suspended from the four cables by steel suspenders attached to steel floor beams seven and one half feet apart. Six longitudinal trusses divide the flooring into five parts. The two outer parts are for the use of vehicles. The two inner divisions are laid with steel rails and provided with endless wire ropes for hauling across the rapid transit cars. Between the two inner divisions and at some distance above them is the space devoted to foot passengers, 15 feet 7 inches in width, a promenade the most elevated and sightly that the world has ever seen. At the Brooklyn end is the machinery which will move the endless ropes and send the cars speeding across the bridge in five minutes' time. The cost of this system of rapid transit will be half a million dollars.

Although numerous accidents have occurred and many deaths have been noted among those employed on this wonderful bridge, it is recorded as a somewhat curious fact that no break has occurred in the engineering staff since the death of the elder Roebling. Associated with Colonel Roebling since the very beginning of the work were C. C. Martin, Col. W. H. Paine, Francis Collingwood, George W. McNulty, and S. R. Probasco, civil engineers, and E. F. Farrington, master mechanic. These gentlemen share with Colonel Roebling in no small degree the honor of its successful completion.

BESSEMER STEEL IN ITS CAST AND UNWROUGHT SHAPE.*

By W. D. Allen, Sheffield.

The rapidly extending use of steel in its simply cast condition, the growing certainty of its being in the near future used very extensively in this unwrought state, and the probability of its superseding cast-iron for thousands of important purposes, lead the writer to believe, that any facts bearing upon the question of steel casting can not fail to be of general interest. The Institute is already in possession of many facts, which have been brought before it at various times, relative to the progress made in casting Siemens-Martin, crucible, and other steels, and of the great success in this direction that has attended the operations at Terrenoire, and also of many valuable and scientific researches touching the properties, nature, and general characteristics of steel in its cast state, contributed by M. Pourcel and others. The writer, however, is not aware that any information has been before the Institute, relative to the progress which has been made in casting steel made by the Bessemer process.

Accounts have frequently been brought under your notice of the extraordinary producing powers of the Bessemer converter—how many blows could be got out in twenty-four hours, or how many thousands of tons could be turned out in a week. These achievements have generally received the attentive and approving ear of the meetings, and the writer feels assured this same courtesy will be accorded to him, although, when speaking of the Bessemer process, he makes quality and not quantity the chief consideration, and endeavors to show, when proper care and consideration are bestowed upon it, what an exceedingly valuable material this steel becomes in its simple cast condition, and how admirably adapted it is for the production of castings of various kinds.

The importance of this question can scarcely be overestimated. When we bear in mind the immense quantity of steel made by this process, and the large number of works throughout the country having it at their command, it will at once appear how desirable it is that such an immense source of supply should be made available to meet the large and ever-increasing demand for steel in its unwrought and simply cast condition. The writer feels strongly that Bessemer steel has not yet taken the important position it should hold as a certain and reliable material for castings, and the only object he has in committing himself to this paper is that of bringing before the Institute his experience in the production of steel castings, and of making more generally known what is doing in this material, in the hope that he may be able to impart some stimulus tending to promote the desired end.

* A paper read before the Iron and Steel Institute.

One grand application of Bessemer steel has of course been for rails. So marvelous has been its success in that direction, and so persistently as it been turned to that use, that there does sometimes appear to be a anger of this splendid material being neglected for other purposes, and ts use for rails becoming its ultimate destiny.

In the good old days of iron, any thing was thought good enough for a rail; and there is little doubt that the notorious application of Bessemer steel to this common purpose has tended to disparage it in general estimation for better things, and there are those who would still contend that its proper use is that of rails, and rails only. Such, however, is not the belief of those best acquainted with the material; nor is it the belief of the writer, who lays claim to having been the first person to work the process, both practically and commercially. Although he has done this on a considerable scale for twenty-four years, he has never yet made a rail, but, on the contrary has applied Bessemer steel to almost every other purpose to which steel could be or ever has been applied—from an intermediate crank-shaft to a cork-screw or a table knife; and in all these various applications he has always found Bessemer steel was in every way well adapted for the purpose. Hence it has fallen to his lot for many years past to make castings of it. Now, castings in Bessemer steel are not a novelty, for doubtless other users of the process have made castings. But so much has been done in that way at the works of Henry Bessemer & Co. that the writer ventures to speak with some authority upon the subject.

M. Pourcel, in his valuable paper on solid steel castings, read at Vienna, remarks: "Blow-holes, so to speak, remain a permanent order of the day in the proceedings of the Iron and Steel Institute." To this the writer thinks he may safely add, there is also a pretty general belief that a ladle of Bessemer steel is a seething boiling mass, quite unsuitable for making sound castings.

Now, when, in the face of all this, the writer has to affirm that sound castings, free of blow-holes, are daily made, in the ordinary course of business, from this material, he feels his statement will be received as rather a bold one. Such, nevertheless, is the fact, and it constitutes the chief feature intended to be brought before you by this paper. In ordinary practice, a ladle of Bessemer steel just out of the converter is no doubt in too lively a condition for making castings; but experience tells us that Bessemer steel is as amenable to the quieting and soothing influences of ferro-manganese, silicide of manganese, or silicide of iron, as steel made by any other process; and in order to bring a ladle of steel into a proper condition for running into castings, the agency of these alloys is to be resorted to. This fact was known and recognized at the works of Henry Bessemer & Co. more than twenty years ago, although at that date the making and offering for sale of ferro-manganese, silicide of manganese, etc., had not become a regular business, as it now has, and it was difficult to obtain these alloys with any degree of certainty and regularity. It was found, however, that a very siliceous pig, made at the Tow Low Works in Durham, was obtainable, which contained from 4 to 5 per cent of silicon, and this was used for many years; in fact, until the improved alloys were produced as ordinary articles of commerce. A small quantity of this siliceous Tow Low iron was added to the charge of spiegeleisen whenever it became desirable, for any special work in hand, to quiet the steel and insure greater soundness; and if the blow was not too hot, or was allowed to lie in the vessel a sufficient time to cool down, it was found to answer pretty well. The solidity of many articles exhibited by Sir Henry Bessemer at the Great Exhibition of 1862 was obtained in this way. Judicious and proper care should, however, be exercised in administering these alloys; for the fact should not be lost sight of, that in their use we are, after all, introducing impurities into the steel—impurities that become very deleterious when in excess, giving a harshness and a hardness to the metal, which tend to deprive it of that beautifully soft, ductile nature so characteristic of good Bessemer steel.

It therefore becomes important, when we do add these quieting agents, to use no more than is absolutely necessary for the purpose, and to see that we obtain the maximum amount of duty from a minimum quantity of the compounds. To insure this result, the agitator (already described by the writer before this Institute) should in all cases be used, as by its agency the small quantity of alloy is quickly and uniformly diffused throughout the ladle of steel, and its full potency obtained. The writer knows of no other means whereby this very important object can be thoroughly effected. In passing, the writer can not refrain from expressing regret that this agitator has not been brought more generally into use; in fact, he has not heard of a single instance of its adoption in this country, although it is, of course, free to all. He trusts, however, that it may have been used without his knowledge; and if so, he can only say that he shall be delighted to hear that such is the case. He can assure the members that the advantages of its use daily manifest themselves in his works, and he is quite sure that much of his success in obtaining sound castings is attributable to its use.

The use of silicon is not necessary in order to produce sound castings. At the works of Henry Bessemer & Co., the only quieting agent is ferro-manganese. A ladle of Bessemer steel judiciously alloyed with ferro-manganese (the ferro-manganese being thoroughly diffused throughout the mass by the aid of the agitator) will run dead and lie perfectly quiet, sinking in the molds like ordinary cast-iron, and a large dead head will always be necessary to feed the casting. In this way are cast cranks, side-cranks, cross-heads, cylinders, rollers, spur-wheels, and various other similar pieces of machinery, which, when finished bright over their whole surface, show neither blow-holes nor blemish of any kind. It is well known, however, that the Bessemer system, as at present generally arranged, is not adapted for making small ingots, that is, ingots under 5 or 6 cwt. each; and from the same causes, it is not adapted for making light castings. A mass of five tons of steel rapidly cooling and prone to set in the ladle does not admit of the delays incidental to running it into small quantities, and the crucible or the open-hearth processes, where the steel can be retained in the furnace until required for casting, have advantages over the Bessemer in this respect.

The success in making sound castings of Bessemer steel, claimed in this paper, is not simply an experimental success, but is a regular and daily practice; and to give one instance as an illustration of the regularity with which it is done, the writer may mention the fact that, during the last four years, amid a multiplicity of other things, he has made 486

hydraulic cylinders of various sizes, as they have happened to be ordered, all of which have been tested up to two, three, and four tons per square inch, while he has never had the misfortune to have one fail in these tests, or to have one of all this number returned upon his hands, through having failed while in use.

And now as regards quality, admitting the ready and perfect practicability of casting Bessemer steel sound and free from blow-holes, there will hardly be a diversity of opinion as to the value and excellence of the material in that state: it is very strong, pure, and homogeneous in quality, and its soft and ductile nature renders it all that can be desired. It also tools beautifully, and some turnings that have come off castings that have never received a blow from the hammer are upon the table, and they serve to give a better notion of its beauty as a simply cast material than all that can be said on this point. The temper or hardness of the steel may of course be varied by the addition of more or less spiegeleisen; but it is rarely found necessary to deviate in this respect with the ordinary run of castings; for although not hard, the continuity of the material renders it exceedingly strong and durable.

The analysis of castings of ordinary quality may be fairly taken at—

Carbon	·30 to ·40
Manganese	1·25
Silicon	trace.
Sulphur	·06
Phosphorus	·07

The feeling which has at all times so generally prevailed, that it was impossible to obtain this material sound and free from blow-holes—as if such were inherent to the process—has always been a blot upon the escutcheon of Bessemer steel: a blot, however, that the writer considers has always been painted in too deep a color, and which he now contends should be rubbed out altogether. This done, it will be found that there is no better material for castings than Bessemer steel.

RECENT PROGRESS IN THE METALLURGY OF NICKEL.

We have from time to time recorded the success of the efforts made abroad in the manufacture of pure nickel, and the progress made in securing new applications for it. As foreign experimenters have taken much pains to keep their aspirations and their results before the public, it has been the impression of all but a few who had special opportunity to inform themselves that the credit for the results achieved was due chiefly if not exclusively to those who have labored in this field in Germany and in France. It is the merit of Prof. W. P. Blake, of New Haven, to have come forward to correct that opinion; and while giving full credit for good work done by others, he has directed attention to the fact that Mr. Joseph Wharton, of Camden, N. J., was in reality the first to produce pure nickel in a malleable state and in considerable quantities. Professor Blake exhibited a remarkable series of specimens at the Boston Meeting of Mining Engineers; and from the paper read on that occasion, we take the following interesting data:

Inasmuch as nickel first became known commercially in the industrial arts in the form of an alloy, there were no special attempts to produce the metal in a state of extreme purity. The nickel-silver of commerce answered all the existing demands, and was of course much easier to make, and cheaper than the pure nickel. It found a large and rapidly extending consumption as a substitute for silver spoons and forks and for silverware generally, especially when the new art of electro-plating was developed by Spencer, Smee, and others. The nickel-silver was specially well adapted to receive and hold the deposit of silver, and it is to this day the most desirable alloy for plating.

The use of nickel alloy for small or subsidiary coins next made an increased demand for nickel. Tentative efforts were made by Dr. Feuchtwanger, in New York, in the year 1837, and he actually issued many one-cent and three-cent pieces, made of a nickel alloy, the exact composition of which he was careful not to state, but called it "Feuchtwanger's Composition." Switzerland began using nickel alloy coins in 1850; the United States in 1857, though sample coins, one-cent pieces, had been made by Prof. James C. Booth, at Philadelphia in 1853, the prepared alloy containing from 5 of nickel and 95 of copper, to as high as 30 of nickel and 70 of copper. The alloy adopted by law consisted of 12 of nickel and 88 of copper. The five-cent pieces now in circulation are made of an alloy of 25 parts of nickel and 75 parts of copper. In 1860, Belgium adopted an alloy of the same proportions, for small coins. Other countries have followed, until the use of nickel alloy for small coins may be said to be almost universal in the chief commercial countries. Up to June 30th, 1876, the United States had alone issued of the five-cent nickel to the extent of $6,716,129 in value. Another sudden demand for a larger supply of nickel sprang up when the art of depositing nickel by electricity was perfected. The many and increasing applications of this art need not be here enumerated. It is sufficient to state that, at the present time, they constitute a large part of the present consumption of the metal in this country, where the art may be said to have originated in a successful, practical form.

Nickel ore is more generally distributed throughout the mineral-bearing portions of the United States than is generally supposed. It is commonly associated with chrome ores from Canada to Maryland on the Atlantic side, and equally with the chrome ores of the Pacific slope, notably in Oregon. It is also a common associate of magnetic pyrites in the Archæan rocks, being found in Litchfield County, in Connecticut; in the Highlands of the Hudson, in New York and in New Jersey; and specially at Lancaster Gap, in Pennsylvania, where the chief supply of nickel has been obtained for the United States. This ore yields from 1½ to 2 per cent of nickel, but is enriched by smelting at the mine into a matte containing 10 per cent or more of the metal. This locality was worked some thirty years ago by Prof. James C. Booth and others, of Philadelphia, and some nickel alloy was made. Some ten years later, Mr. Joseph Wharton purchased the works and established the industry at Camden, N. J., opposite Philadelphia, where it has since been carried forward.

A large portion of the metal produced at these works by Mr. Wharton has been used at the United States Mint for the subsidiary small coins, and a considerable amount has been exported. Since the development of nickeling by galvanism, a large part of the product has been put into the form of nickel salts and anodes.

But Mr. Wharton, not being content with the production of impure nickel, early began experimenting to determine whether nickel could not be produced in a pure and malleable condition, susceptible of being worked in nearly the same manner as iron, and of being applied in the manufacture of various objects, requiring strength of material and a material that can not be easily oxidized. One of his earliest experiments was to take the somewhat spongy mass got by reduction of the oxide of nickel, and, after heating it to full redness, work it under a steam-hammer into a bar.

In 1873, Mr. Wharton sent to the Vienna Exhibition a sample of nickel in the form of axles and axle-bearings, and at the Exhibition in Philadelphia in 1876, he exhibited a remarkable series of objects made of *wrought nickel*, such as bars, rods, a cube, a horse-shoe magnet, and magnetic needles of forged nickel. These did not excite the interest to which they were entitled as a remarkable advance in the working of this little-known metal. The exhibit did not cause much comment, and it was not specially described or reported upon, so far as I am aware, except by the judges who reported the exhibit to the Commission as worthy of an award in the following terms: "A fine collection of nickel ores from Lancaster County, Pa., with nickel-matte, metallic nickel in grains and cubes, and manufactured nickel, both cast and wrought; nickel magnets and magnetic needles, cast cobalt, electro-plating with nickel and cobalt, and salts and oxides of both these metals; the whole showing a remarkable degree of progress in their metallurgical treatment." *

Some of the same objects formed of wrought nickel were sent over to Paris two years later, and were exhibited in the American section in 1878. There, as in Philadelphia, they did not at first excite any surprise or receive any special attention. Very few persons realized what the objects really were, and that they were very different from *alloys* of nickel. In fact, very few chemists had ever seen *nickel*. Pure nickel was a rarity, a curiosity, just as samples of indium or thallium are to-day.

You can then, perhaps, imagine the incredulity of the expert chemists and metallurgists of Europe, when whole ingots and forged bars of metal and numerous finished articles of pure wrought nickel, without alloy, were offered for inspection. These articles not differing greatly in their appearance from the higher grades of nickel alloys, or from electro-nickel objects, they passed them without surprise. No previous exhibition had been so rich in exhibits of the use of nickel and in the products from them. The influx of the pure carbonated and oxidized ores from New Caledonia had greatly stimulated the nickel industry in Europe, and had improved the quality of the alloys of nickel. New companies had been formed to manufacture nickel-silver and to produce nickel from these superior ores, at a lower cost than had before been possible. Christofle, of Paris, had just erected extensive works at St. Denis, and had made a most brilliant display of his products in one of the main avenues of the Exposition. The Vivians, of Swansea, and other exhibitors, had large cases filled with beautiful objects of hollow and solid ware made of nickel-silver. Amid these various exhibits of striking *tours de force*, the modest little show-case from the United States with examples of manufactures of *pure wrought nickel*, not alloy, could hardly be expected to excite attention and win the golden award, which was most cheerfully accorded as soon as the fact was demonstrated by analysis that the objects were really of the pure metal. Some of the objects now shown were at that exhibition, and have retained their brilliant polish and luster unimpaired. These notable advances in the metallurgy of nickel, made with the lean and sulphureted ores of Lancaster Gap, prepared the way for greater advances.

Dr. Fleitmann, of Iserlohn, Westphalia, Prussia, has improved and cheapened the operation of refining the nickel and toughening it, and has reduced the liability to the presence of blow-holes in castings by adding to the molten charge, in the pot, when ready to pour, a very small quantity of magnesium. This is immediately decomposed, magnesia is formed, and graphite is separated. It would seem that the magnesium decomposes the occluded carbonic oxide, or reduces it to a minimum. The magnesium must be added with great care, and in small portions, as it unites explosively with the charge. It is stirred in. About one ounce of magnesium is sufficient for 60 pounds of nickel. From three quarters of an ounce to 54 pounds of metal have been used with success by Mr. Wharton. The nickel from the ore at Lancaster Gap seems not to require as much as the foreign metal. It is to be noted that complete malleability of nickel was obtained at Wharton's works in Camden, before Fleitmann's invention or process, but this last is more rapid and better than the old method. The metal so treated becomes remarkably tough and malleable, and may be rolled into sheets and drawn into wire. Cast plates can be successfully rolled. The cast plates, such as are made for anodes, after reheating, are rolled down to the desired thickness. It is found that it is a great improvement to the nickel anode plates to roll them down. They dissolve with greater uniformity in the bath. Nickel so treated with magnesium has been rolled into sheets as thin as paper. Expensive works for rolling the metal have been erected by Mr. Wharton at Camden. There is already a train of 40-inch rolls, 18 inches in diameter, with annealing-ovens and gas-furnaces and their adjuncts, and a 90 horse-power engine. At present, this mill, as well as the works for producing the metal, and the mine, also, are "shut down." The largest sheet yet rolled at Camden is 72 inches long and 24 inches wide, of pure nickel.

Dr. Fleitmann has also succeeded in welding sheet-nickel upon iron and upon steel plates, so as to coat them equally on each face with a layer of nickel. The quantity preferred by weight is $\frac{8}{10}$ iron and $\frac{2}{10}$ nickel, one tenth of nickel being placed on each surface. To secure union, the iron or steel must be perfectly flat and clean. A pile is made with outer facings of sheet-iron, to protect the nickel from scaling. When the whole is heated to the proper degree, it is passed through the rolls. The two metals become so firmly united that they may afterward be rolled down two or three together, or separately, to the thinness desired.

IN order to decrease the dimensions of fly-wheels, builders are beginning to cast lead into the rims.

* Reports and Awards, Group I., 640, p. 470.

UTILIZATION OF BY-PRODUCTS IN THE MANUFACTURE OF COKE.—I.

Notwithstanding the fact that for many years the utilization of the tar and ammonia liquor has been a very important industry in gas manufacture, the gathering of these products in coke-making has only attracted attention during the past few years. Our columns have reflected the movement now going on abroad, and we propose in this series of articles to place on record the different systems thus far brought forward, together with the data of actual work accomplished. It is to be regretted that on the latter point the figures are as yet very meager. We shall discuss them after a presentation of the ovens used.

The Carvés System.—Beginning with the system longest in use and most thoroughly tried, we abstract the following from a paper read by Mr. H. Simon before the British Iron and Steel Institute in 1880:

Each oven is in the form of a long, high, narrow chamber of brickwork, and a number of these are built side by side, with partition-walls between them sufficiently thick to contain horizontal flues. Flues are also formed under the floor of each oven, and at one end of these is a small fire-place, consisting of a fire-grate and ash-pit with suitable door, the fire-door having fitted above it a nozzle, through which gas produced from the coking is admitted, to form a flame over some fuel burning on the grate. Only a very trifling amount of such fuel, consisting exclusively of the small refuse coke, is used here, its function being really more that of igniting the gas than that of giving off heat. These grates are not charged with fuel more than twice every twenty-four hours when in regular work.

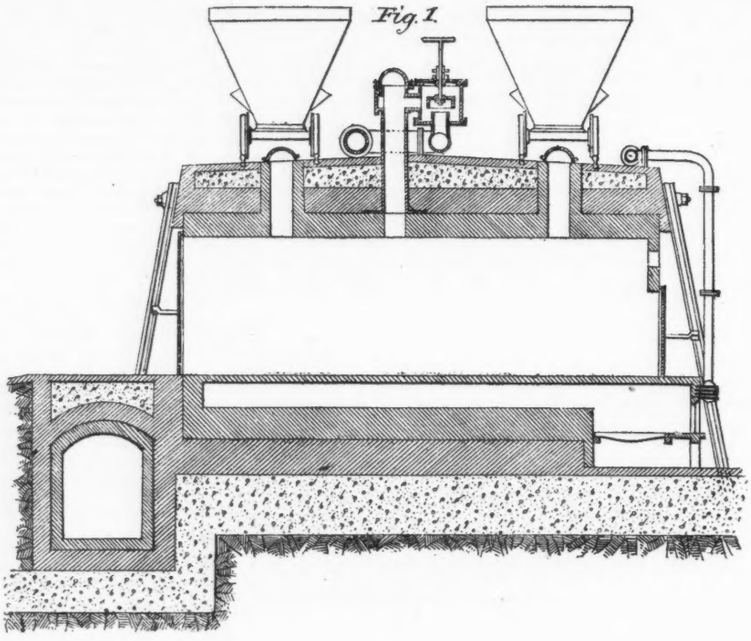


Fig. 1.

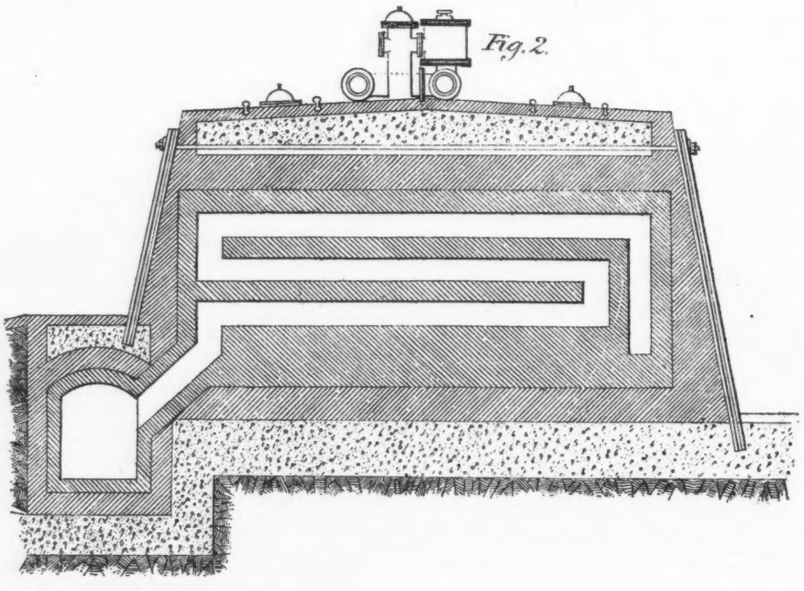


Fig. 2.

The products of combustion pass from the fire-place along a flue under the oven floor to the end farthest from the fire. They return along another flue under the floor to the fire end; they then ascend by a flue in the partition-wall to the uppermost of several horizontal flues formed therein, and *descend* in a zigzag direction along these flues, finally passing into a horizontal channel leading to a chimney. Thus the coke-oven is heated not only at the bottom in the usual manner, but also evenly at the sides, and the coal with which it is charged becomes rapidly and completely coked. No air is allowed to enter the ovens, which, in reality, are closed vessels, with the exception of the openings for the escape of the volatile products.

In the bee-hive and similar ovens, coking can not be carried on without a considerable quantity of air being admitted during a certain period, at least, of the process. Coking under such conditions, therefore, is carried on at the expense of the combustion of part of the coke made. In these ovens, no air is admitted, and no coal or coke is burnt; hence, there is a greater yield of coke, amounting up to say 75 per cent of the coal charged. At the same time, the coke produced must obviously be purer than that produced in the bee-hive class of oven; for the quantity of ashes and impurities existing in a given ton of coal will in this case be contained in a larger quantity of coke than in the case of coke made in the bee-hive oven.

The improved ovens are fed with coal by openings in the roof, over which coal-trucks are run on rails; and the coal is evenly distributed by rakes introduced at end openings provided with doors, faced with refractory material, which doors are closed and kept tightly luted while the oven is in operation. The feed-holes in the roof are also provided with covers. Through the middle of the roof rises a gas-pipe provided with an hydraulic valve, which closes the passage by a lip projecting down from it into an annular cavity surrounding its seating, in which it is immersed in a quantity of tar and ammoniacal liquor lodged there during previous distillations. The volatile products of the coal distillation rise by the gas-pipe, and are led through a range of pipes kept cool by external wetting, so that the tar and ammoniacal liquor become condensed and separated from the combustible gas.

The quantity of these by-products depends, of course, mostly on the nature of the coal used. The richer the coal is in bitumen or gas, the greater the value of the by-products. Much also depends on the proper conduct of the temperature at the different stages of the coking process; for it is quite possible to obtain even from the same coal different proportions, quantities, and qualities both of the coke and the by-products.

Practical experience must in each case determine what is best adapted to local requirements and circumstances.

The mode of the collection of the by-products is very much like that used in gas-works. The cooling-pipes are conveniently arranged in pyramidal form, surmounted by a water-pipe having numerous holes, so that a shower of water descending on the uppermost of the cooling-pipes and on the outermost is scattered over all their surfaces. The gas, when thus separated from the condensed materials, is further passed through scrubbers, or vessels containing coke moistened by the ammoniacal liquor, which, on being repeatedly used, becomes stronger and stronger until it reaches saturation, when it may be run off into reservoirs, to be treated in the ordinary way for the preparation of ammoniacal compounds, or sold in its crude state for the manufacture of soda. All valuable by-products having thus been withdrawn from the gas, it is led by pipes to the nozzles at the fire-places under the sole of the ovens, where it is burnt. It has been found that the extraction of gas from the ovens by artificial means (say a Beal's exhauster similar to those used in gas-works) is more regular, and therefore preferable to extraction by the natural draught of the chimney only, as the latter varies often according to wind and temperature. When a charge is nearly finished and ready to be taken from the oven, some trucks full of coal are placed ready on the rails going right along on the top of the ovens and over the charging-holes. The two end doors are then opened. The mass of coke, measuring about 30 feet long by 2 feet thick and 6 feet high, is pushed out at the back of the oven and on to the bank by means of a ram or piston, worked by a portable steam-engine running on rails in front. The ram can be brought opposite to each oven in turn. The coke is then quenched as usual.

The watering or quenching operation should be performed with care and judgment. On the one hand, the mass of incandescent coke should, as soon as it is out of the oven, be extinguished as quickly as possible, to avoid loss of coke by actual burning; and, on the other hand, care must be taken not unnecessarily to saturate the coke with water. The coke produced in such ovens, side by side with other systems and out of the same coal, is preferred by the blast-furnace managers. Similar experience has been communicated to me from the Ebbw Vale Company with regard to the coke from their Coppée ovens, which, as already mentioned, have very much the same shape and size

as these. Immediately after the discharge of an oven, the top openings are opened, the coal from trucks emptied into the hot oven and raked level; the doors and top openings are then closed again, and the process begun afresh. The operations of discharging and refilling, when well conducted, need not take more than from ten to fifteen minutes.

The Terrenoire Company, in France, originally introduced a modification of this process in the year 1867, and has since then, from time to time, increased the number of such ovens at its different works. Their proportions and construction generally have during these years undergone continued and considerable alteration and improvement. Experience has shown that a great deal depends upon the dimensions of the vertical sections of these ovens. At the outset they were made too wide and too low, and the density or hardness of the coke was, under such circumstances, not such as was desirable. From a width of 6 feet 6 inches, they have gradually come down, until at present they recommend about 2 feet only, and a hight of at least from 6 to 7 feet. It is interesting to notice the beneficial effect upon the hardness of the coke which the reduction in width has had.

M. Jouguet, the director of the Bessèges Works, belonging to the Terrenoire Company, has made for me the experiments specified in the following table:

TABLE SHOWING RESISTANCE TO CRUSHING OF SIX DIFFERENT KINDS OF COKE, EXPERIMENTED ON BY M. JOUGUET IN 1880, AT THE BESSEGES WORKS OF THE COMPAGNIE DE TERRENOIRE.

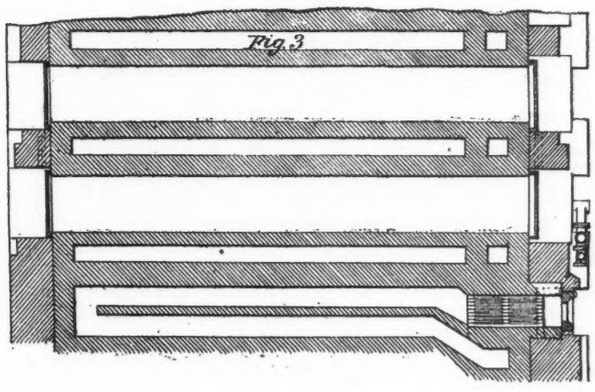
(Resistance per square centimeter in kilos.):

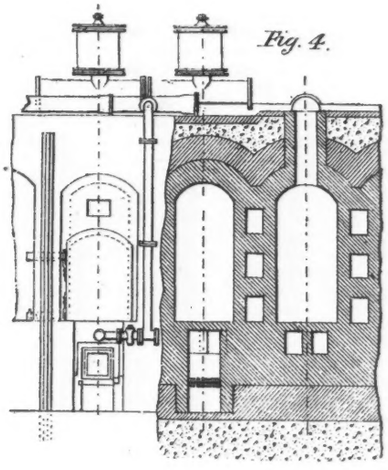
1.	Coke from	Carvés	ovens of	70	centimeters	width	(27 9-16	inches)	66·46	kilos.
2.	"	"	"	66	"	"	(26	")	79·72	"
3.	"	"	"	50	"	"	(19 11-16	")	92·32	"
4.	"	Bee-hive	"	50	"	"	(19 11-16	")	43·92	"
5.	"	Belgian	"	50	"	"	(19 11-16	")	53·12	"
6.	"	Coppée	"	50	"	"	(19 11-16	")	80·50	"

Nos. 1 to 3 show clearly that the hardness of the coke increases as the width of the oven (or the thickness of the layer of coal treated) decreases. This result is ascribed to the more intense heat to which the coal or coke is subjected by being, in narrow ovens, on an average nearer to the flues in the vertical walls of the ovens. It is indeed clear that, when a large quantity of coal is heated in an oven, a considerable time will elapse before it all can become heated to the same degree, and that during that time the process of coking will be carried on at different temperatures in different portions of the whole mass; and it seems equally clear that it is easier to obtain regular results with a thinner layer of coal, which can be more readily penetrated by the heat, and maintained at the desired temperature. Experience has shown that not only the density but also the yield of coke is benefited by this reduction in width. The greater vertical dimension of the Carvés oven, comparing it with the bee-hive, also has a favorable influence on the average density of the coke. The time required for each charge varies according to the description of coal and the dimensions of the ovens. In the ovens of 2 feet width, a charge is finished every forty-eight hours. In the ovens of 3 feet width, from sixty to seventy-two hours are required. The system secures the whole of the fixed carbon in the coal, say about 75 per cent; much less than this is got by the bee-hive ovens, from 55 to 65 per cent being generally considered a fair yield. Besides the utilization of by-products, the *heat* of the hot gases is in this system, as well as in others, still utilized to a considerable degree.

M. Jouguet states that at the Bessèges works steam is produced to the extent of about 45 pounds and of 4½ atmospheres pressure per hour and per ton of coal coked; and that under more favorable circumstances 59 pounds of steam should be obtained; that is to say, taking about 17½ pounds of steam as necessary to produce one horse-power per hour, as at Bessèges, 1400 kilos (3080 pounds) of coal are carbonized per oven and per twenty-four hours. Each oven gives about 3⅜ horse-power of motive power, and could be driven to give about 4⅛ horse-power. At Bessèges, all the machinery required in the manufacture of coke and its by-products is now driven by steam raised in this way, and there remains a large surplus, which is used in the blowing-engines for the Bessemer process, for lifting charges to furnaces, etc.

THE Delaware, Lackawanna & Western road has been opened for through traffic from New York to Buffalo. Officials of the company state that full schedule rates will be maintained. It is reported that the company will extend its Lackawanna & Bloomsburg Division from Northumberland, Pa., into the Clearfield region, and will also build a line between Wilkes-Barre and Scranton.





THE DEPHOSPHORIZATION OF PIG-IRON.

Under date of May 22d, the Patent-Office has granted Mr. James Henderson, of Bellefonte, Pa., a patent on the dephosphorization of pig-iron, from which we abstract the following:

The object of this invention is to free crude iron of phosphorus by an economical operation; and to this end the invention consists of a process comprising the following operations, namely, first, the decarbonization of the crude iron, in whole or in part, by the action of air upon it while in a liquid condition: second, the treatment of the partially or wholly decarbonized iron, while in the liquid or molten condition, with a calcareous reagent and an oxide of iron, as more fully herein set forth.

The crude iron to be treated is by preference melted in a cupola-furnace, such as is used for melting pig-iron in the manufacture of Bessemer steel. The melted iron is run into a Bessemer converter, which may be lined with the usual siliceous lining, commonly called "ganister." The air is blown into the melted metal in the converter in the usual manner practiced in the Bessemer process for decarbonizing the metal. The operation is continued by preference to the end of what is called the "third period" or "after the boil," at which time the carbon in the iron is reduced to about one per cent; but the operation may be continued to the "end of the blowing," when, practically, all of the carbon is removed. The decarbonized iron thus obtained is transferred to a ladle with a hole in the bottom, closed with a plug-stopper, and is permitted to run from the said hole into a spout which delivers it into the hearth of a reverberatory furnace, which is capable of being heated to the melting-point of wrought-iron, or higher. The kind of reverberatory furnace which I prefer to use for this purpose is a gas-furnace constructed with a revolving movable hearth which is capable of being revolved upon an upright axis when in the furnace, and of being applied to and removed therefrom, the fuel used in said furnace being preferably the gases evolved by the combustion of bituminous coal, which is burned by means of jets of heated air. The metal is heated in said furnace in contact with the basic reagents for a short period—say from ten to thirty minutes—when the lime is in the condition of fluor-spar, depending upon the smaller or larger portion of carbon remaining in the iron at the time of its introduction into the furnace; after which, a sufficient quantity of compounds of carbon, iron, and manganese—as spiegeleisen or ferro-manganese—is added to it for the purpose of recarbonizing the metal, as in practicing the Bessemer process. Then the metal is permitted to run from the furnace, and is cast into ingots in suitable molds.

The preferred mode of applying the reagents is to spread the compound of them upon the hearth of the furnace before the melted decarbonized metal is permitted to run into the furnace, and also to heat the compound until it becomes viscid; and I prefer that the hearth of the furnace should, previous to use, be lined with lime or other calcareous material, or with magnesia, or iron plates, as described in my English Patent No. 1051 of 1870, and in my United States Patent No. 106,365. By thus protecting the metal and the reagents from contact with silica, it is found that the work is accomplished better.

I prefer that the lime of the basic reagents shall be in the condition of fluor-spar, and that the oxide of iron shall be in the form of titaniferous iron ore, and that the relative proportions of the two shall be forty parts, by weight, of fluor-spar to one hundred parts, by weight, of titaniferous iron ore. The proportions of the reagents to be used may, however, be varied, and will depend upon the quantity of phosphorus present in the metal. If, for example, the phosphorus present is one per cent of the metal, the amount of fluor-spar and titaniferous iron ore required will be about three hundred-weight of the mixture of the two to one ton of steel; and if the phosphorus be present in less quantity, the quantity of the mixture of the reagents may be correspondingly reduced.

The reagents above described may be replaced by their substitutes. Thus, caustic lime or limestone may be substituted for fluor-spar weight for weight, and the titaniferous iron ore may be replaced by rich magnetic oxides or hematites as free from silica, sulphur, and phosphorus as possible. The use of an oxide of iron in conjunction with fluor-spar or its equivalent is deemed preferable to either fluor-spar or oxide of iron separately. When combined in use, the reaction will proceed more energetically, with a corresponding economy of time and saving in cost. The oxide of iron also protects the metal measurably from oxidation during the removal of the phosphorus.

The process above described is characterized by the dephosphorization of the iron after its decarbonization, and this is important, because if

lime in the form of fluor-spar should be introduced into the metal while in the converter before decarbonization, the fluorine of the fluor-spar, by combining with a portion of the silicon of the iron, and carrying it off in vapor or in gas, would rob the metal of a substance (silicon) whose combustion by the blast is important for the purpose of keeping the melted metal at the requisite temperature, and the practical result would be the reduction of the temperature of the metal so low as to render the operation of casting it difficult. If, on the other hand, as above provided for, the metal be subjected to the action of the purifying reagent after the silicon has been consumed in the process of decarbonization, the temperature of the metal will not be reduced by the action of the purifying agent to any practical extent.

The additional heat applied to the melted metal in the reverberatory furnace during the treatment is advantageous. It obviates the risk of the metal becoming cooled by the too prolonged detention in the vessel in which it is treated, and also supplies the requisite heat to maintain the metal in a melted condition in case the heat which is inherent in it previous to treatment is not sufficient for that purpose.

It is understood that the operation of decarbonization, as carried on in a Bessemer converter, by means of injected jets of air, as above set forth, is attended with the desiliconizing of the metal, whereby the metal is substantially free from silicon, silicates, silicic acid, the presence of which would seriously interfere with the succeeding dephosphorizing operation.

What is claimed is—

1. The improvement in the art of manufacturing iron and steel, which consists in first decarbonizing the metal, while in a molten condition, by means of jets of air, and afterward treating the decarbonized metal, while free from contact with siliceous substances—such as the lining of the containing-vessel—with a calcareous reagent and oxide of iron, to remove the phosphorus.

2. The improvement in the art of manufacturing iron and steel, which consists in first decarbonizing the metal, while in a molten condition, by means of jets of air, and afterward treating the decarbonized metal with a calcareous reagent and oxide of iron, while the metal is maintained in in a liquid condition by the application of additional heat.

3. The improvement in the art of manufacturing iron and steel, which consists in first decarbonizing the metal, while in a molten condition, by means of jets of air, and afterward treating the decarbonized metal with a calcareous reagent and oxide of iron, to remove the phosphorus.

THE BASIC PROCESS AT STEELTON.

The *Bulletin* of the American Iron and Steel Association contains the following announcement in reference to the introduction of the basic process, the first news of which was published in the ENGINEERING AND MINING JOURNAL of May 5th:

The Pennsylvania Steel Company, having found it unnecessary to work its original Bessemer plant, on account of the large product of its new three-converter plant, determined to make a test of the basic process, and accordingly began two or three months ago to make such alterations in the old plant as would suffice to give the new process a practical test. The alterations consist principally of the change of a cupola into a calcining kiln for calcining the dolomite, arrangements for preparing the dolomite for use, and the molds requisite for putting the dolomite into place in the cupolas and converters. The preparations having been completed, a start was made on Monday, May 7th, 1883, and the first heat of basic steel ever made in this country was a decided success, the steel showing excellent physical tests, and was suitable for boiler plate, although not so low in phosphorus as other heats made later with a longer "overblow."

The dolomite was obtained from the extensive deposits at Chickies, Lancaster County, Pa., and the lime for the "additions" was from the immediate vicinity of the works. The pig-iron used was made at the Lochiel Furnace, under the supervision of the Pennsylvania Steel Company, of puddling-furnace cinder and South Mountain ores, and contained of manganese and phosphorus each about 2½ per cent, and of silicon about one per cent, being principally mottled in grade.

The process has continued regularly every day, and with very encouraging results. It may be expected that various difficulties and drawbacks will appear in time, as is usually the case in such experiments; but so far, the results have been very good. The steel has been subjected to very severe flanging and punching tests, and shows great fitness for many purposes, according to the carbonization obtained, in some respects excelling any former product at the works.

The Pennsylvania Steel Company is to be congratulated on this successful introduction of a process so important in its relations to our future history.

The editor of the *Bulletin* adds: Several specimens of the steel described above have been sent to the Philadelphia office of the Pennsylvania Steel Company, No. 208 South Fourth street, where we have had the pleasure of examining them. There are several bars, which have been broken, to exhibit in the fracture the characteristics of the steel. It presents a handsome appearance, fully equal to that of steel made by any other method. The label on one of the bars, which was taken from heat No. 1, states that the pig-iron from which this steel was made was smelted from one half puddling-furnace cinder and one half iron ore from South Mountain, Cumberland County, Pa.; the pig-iron contained 2½ per cent of phosphorus, 2½ per cent of manganese, and 1 per cent of silicon; the steel contained 0·04 per cent of phosphorus, 0·275 per cent of manganese, and 0·29 per cent of carbon. Some flat bars shown had been plunged in water when hot and then bent cold and hammered down flat without showing any fracture. But perhaps the finest sample on exhibition is a plate flanged hot, on which the flange is as perfect as if the material had been the best charcoal hammered plate iron. In other parts of the plate, holes were cold-punched without cracking the plate in the least, and in one case two holes were punched within one sixteenth of an inch of each other without cracking the intervening steel. These tests show very clearly the excellent quality of the basic steel made by the Pennsylvania Steel Company, and demonstrate that, so far as chemical and mechanical results are concerned, the basic process is a complete success.

THE LAW AS AFFECTING MINING AND METALLURGICAL INTERESTS.

RECENT RULINGS OF THE GENERAL LAND-OFFICE.

Patents for Relocated Placer Claims.—"A" made application for sixty acres of placer ground in 1874; publication was duly made in June of the same year. Within the sixty days of publication, "B" filed a protest and adverse claim, basing it on priority of possession to about twenty acres. The courts rendered judgment in favor of adverse claimants. "B" subsequently abandoned the twenty acres, and afterward "C" relocated this abandoned portion. "D," the present applicant for patent, is now shown to be in possession of the entire sixty acres as originally applied for, having obtained his title by a chain of conveyances from the original locators, by sheriffs' deeds, and conveyances from the relocators of the abandoned portion. Now "D" proceeds under the application of "A" to obtain patent, and upon this statement of facts the Commissioner of the General Land-Office comments: "In the opinion of this office, this procedure of 'D' is irregular. His title to the twenty acres is through adverse interests and a relocation of property formally awarded to 'B.' Other persons may claim title also by virtue of a relocation, and the only way they could assert their rights would be under a new publication for that portion of the ground obtained by 'D' through the relocation of 'C,' and the filing by such persons of their adverse claim during the period thereof." In order to protect the rights of all parties, the commissioner is of the opinion that the entry of the present applicant "D" be canceled to the extent above mentioned, that is, for the twenty acres.

Fraudulent Coal Land Patents.—A patent for coal lands which a patentee obtains by falsely representing in his proofs that the same are agricultural in character is void, and will be canceled when the facts are properly brought before a court of competent jurisdiction. In all cases, however, the presumption is in favor of the regularity of the proceedings which led to the issuance of the patent, and the verity of the record can not be overcome by a mere statement "that at the time of location there was a vein of coal clearly observable cropping out on the surface." It is not the province of the General Land-Office to decide as to the validity of a patent in such a case.

Mining Claims in Unconfirmed Mexican Land Grants.—When the question was asked Whether a Surveyor-General would be authorized in surveying a mining claim within the boundaries of an unconfirmed Mexican grant, which grant had been reported to Congress for its action thereon, the reply was, after quoting the act of July 22d, 1854, and section 2319 of the Revised Statutes and the treaty of Guadalupe Hidalgo, that it has always been the policy of the General Land-Office to treat lands in this condition as reserved not only from sale but from exploration and location by mineral claimants.

Relocation of Abandoned Mining Claims.—When a mining claim is abandoned subsequent to publication and prior to entry and payment, a case would be presented in which the executive department would be compelled to take jurisdiction, because the law under that state of facts allows the abandoned land to be again located by any qualified person in the same manner as if no location of the same had been made, and makes no provision for the determination elsewhere of any question or controversy arising out of this class of conflicting claims.

Annual Improvements.—The fact that large expenditures have been at some prior period made upon a mining claim does not excuse the claimant from the necessity of complying with the law in making annual improvements or performing annual labor.

Appeals from Decisions of Local Offices.—When a mine claimant does not appeal from the decision of the local office adverse to him, the decision is not necessarily final. Where a party contestant, against whom a decision is rendered by the local officer, fails to appeal, the decision is regarded as final as to the facts, under the rules; but it is no violation of the rules in such cases for the Commissioner of the General Land-Office to set aside the decision of the local officers on account of conclusions reached under statutory provisions, such a course being pointed out and authorized by rule of practice No. 47, Subdivision 2.

A NEW PLAN OF UTILIZING BLAST-FURNACE SLAG.

Mr. A. D. Elbers, of Hoboken, N. J., who was prominently identified with the utilization of blast-furnace slag in the manufacture of mineral wool, has come forward recently with a plan for the conversion of mineral wool into silicates previously desulphurized, to be used in the manufacture of china cement, pigments, and absorbents. Mr. Elbers gives the following details in regard to his method, a patent for which has been applied for:

The suitable raw material is uni-silicate or neutral slag, the composition of which contains the usual percentage of sulphur in soluble compounds. The first and well-known operation is the reduction of the slag to a finely fibrous condition, by subjecting it, while in the fluid state, to jets of steam. While the steam divides the fiery mass into fibers, it also slightly reacts chemically on the sulphur compounds, whereby the fibers become predisposed to further reduction. The second operation is the roasting of the now fibrous and very voluminous slag, until no further evolution of sulphurous acid vapors takes place, whereby the opening of the fibers and the reuniting or fritting together of their constituents—freed from sulphur—is accomplished. The fibrous slag has been changed to a granular substance of purified composition: if the heat is increased after this change has taken place, the result will be a fused mass of desulphurized slag; and if too much heat is applied before desulphurization, the fibers will be re-melted into fused slag of the original composition.

A Hessian crucible is filled with the wool, and is then placed in the fresh-glowing coal fire of a stove or range, and allowed to remain there about an hour. It will then be found to contain, beginning at the bottom:

1st. Fused desulphurized slag, forming the crust of:
2d. A fritted porcelain-like mass, often spotted with iron oxides.
3d. A mass of whitish, soft silicate, containing some impurities.
4th. Greenish, sensibly sulphurous, partly opened silicates.
5th. A spongy, dark mass, in which the fibers are yet discernible.
6th. On top: nearly unchanged mineral wool.

By re-heating No. 4, No. 3 is obtained; Nos. 5 and 6 may be reduced in the same ratio; and if the heat is just sufficient, the whole charge may be

converted in one heat to the most desirable condition, which for most purposes is that of the No. 3 specimen.

This desulphurized and easily friable silicate is finely pulverized, and after being purified by washing, is then ready for use in the arts, as slag-silicate of lime, alumina, and magnesia. Its color, according to Mr. Elbers, is white; if it has a darker shade, it may not have been thoroughly desulphurized, as the testing with acid will show. Mixed with water only, the silicate may be cast in molds, but it will scarcely be sufficiently plastic to be formed by hand, unless clay is added. The plasticity of the silicate may, however, be brought to a high degree after treatment with diluted sulphuric acid, and if the acid solution is not used to excess, it is presumable that its chemical action will be mainly confined to the formation of sulphate of lime and to the proportionate setting free of silica. For quick preparation, the silicate is sparingly moistened with a strong solution of four parts by weight of water to one part of acid, when the formation of sulphate of lime is readily noticed. After slight stirring and quick washing with more water, the latter is drawn off until the mixture becomes lusterless and apparently nearly dry. It is then ground for about a minute in a mortar, the luster reappears, the mass becomes viscid, like putty, and can then be formed and air-dried at ordinary temperature. If the mass contains unneutralized acid, is put away for weeks, then broken up, soaked in pure water and worked over, its plasticity and fineness have increased. The hard-fritted and the partly fused specimens (No. 1 and No. 2) are not easily attacked by acids, but after mixing in finely ground or sand-like condition, cementation will set in gradually and the mass will become very hard.

THE COPPER INDUSTRY OF FRANCE.

M. Paul Trasenter, the eminent physician of Liége, sends us the following table of the official statistics of the copper industry in France, it being, we believe, the first time that the data referred to have been gathered in so complete and comprehensive a form. It is unfortunate that the plan of collecting these statistics has been repeatedly changed; but M. Trasenter's notes bring order into the chaos. As for the ore mined, the figures include the French and Algerian mines. From 1861 to 1869, inclusive, the poor pyrites of Chessy and Saint-Bel in the department of the Rhine have been included; but they can not really be considered copper ores, and the third column shows that they were not worked for copper. The columns giving the imports of copper and iron unfortunately jumble both together; for later years, they appear to be the aggregate of imports of black copper and of ores. Until 1878, the figures for the production include the output of those works which produced manufactured copper from imported ingot. During the three years 1876 to 1878, the production of brass was not ascertained, and since 1879 the official French statistics only include the product of actual metallurgical operations; that is, the metals abstracted from ores and mattes received from Chili and other countries. With these explanations, the official statistics will be better understood:

	Production of French Mines.			Imports.		Products Worked.	
Year.	No. of workmen.	Ore mined. Tons.	Worked for copper. Tons.	Raw copper. Tons.	Ore. Tons.	Copper Tons.	Brass, etc. Tons.
	1.	2.	3.	4.	5.	6.	7.
1850	59	5,030	.....	6,670	.....	880	.....
1851	63	5,020	.....	8,150	.....	1,920	.....
1852	108	9,290	.....	8,770	.....	1,920	.....
1853	125	8,760	1,710	920	4,600	4,920	.....
1854	153	6,210	5,720	2,120	7,400	6,630	.....
1855	240	9,290	11,700	2,320	6,930	7,190	.....
1856	288	12,370	12,120	3,730	6,030	7,270	.....
1857	243	11,260	11,200	3,430	6,040	7,110	.....
1858	212	12,000	12,000	2,800	6,230	8,250	.....
1859	?	?	11,250	7,620	2,900	8,830	.....
1860	327	16,220	10,370	4,680	4,330	6,440	2,030
1861	664	46,540	14,300	6,430	5,540	7,070	4,340
1862	734	49,830	4,370	6,920	6,620	6,750	5,870
1863	777	70,870	12,020	8,788	7,180	7,680	7,080
1864	811	90,820	26,540	10,680	5,340	10,120	6,290
1865	731	70,910	15,485	16,990		9,950	8,260
1866	643	73,370	15,730	18,340		10,110	9,120
1867	768	75,500	15,930	19,340		4,880	15,130
1868	748	81,130	13,730	20,090		7,490	14 500
1869	745	92,520	15,730	25,670		9,500	12,340
1870	161	4,910	8,540	23,220		6,570	11,160
1871	211	6,750	11,590	28,430		7,470	13,650
1872	223	7,650	32	28,570		6,220	15,220
1873	200	2,500	.....	21,990		9,720	11,910
1874	571	6,930	934	30,520		11,260	11,700
1875	636	9,750	2,054	31,770		11,470	12,600
1876	980	13,620	5,900	15,980		6,640	.....
1877	....	12,200	5,900	16,070		7,110	.....
1878	448	7,490	4,820	17,140		8,400	.....
1879	...	7,030	.....	10,000		3,350	.....
1880	998	12,800	.....	11,370		3,300	.....
1881	900	16,750	.....	15,600		*3,395	.....

* And 730 tons matte.

M. Trasenter, by carefully going over the figures since 1869, has compiled the following estimate of the production of copper in France, including that from foreign mattes. The column for ores in 1880 and 1881 includes about 7000 tons of poor ores from the Alps Maritimes:

Year.	Production of ore, tons.	Production of copper, tons.
1869	499	1 500
1870	688	2,100
1871	1,492	2,720
1872	1,491	2,600
1873	2,432	2,140
1874	6,008	2,000
1875	8,698	2,300
1876	7,724	2,230
1877	6,306	2,330
1878	2,668	3,500
1879	548	3,350
1880	8,649	3,300
1881	8,170	3,395

DRIVEN-WELL PATENTS.

The Federal Court of Des Moines, Iowa, on the 19th inst., rendered an opinion on the question of the validity of Nelson W. Green's driven-well patent, a case that has been pending for some time. The court holds that there are two well-established instances of prior use of the principle involved in this patent, one of them being at Independence, Iowa, where a well was sunk in the early summer of 1861, and the other at Milwaukee, where a large number of them were put down as early as 1849, the patent to Green not having been issued till 1868, and the application of the principle not having been discovered and put into use by him until after the well at Independence was proved a success. The court holds that Colonel Green made no effort to prevent the use of his discovery by the public for about seven years, and it is upon this showing, more than the fact that the Iowa and Wisconsin wells antedated Colonel Green's discovery and application of the principle, that the patent is held void. The court also held that the issue was void for the reason that it set out a broader claim than was contained in the original patent. Over three hundred actions, principally against farmers, for damages, were pending in this court on this patent. Many more had confessed judgment and settled at heavy costs, and still others had paid the royalty exacted by the drive-well agents, who, a few years ago, swarmed over the Iowa prairies hunting up causes for action. So annoying had these persecutions become that a defensive alliance of farmers was formed, and many defended their premises with shot-guns against the incursions of drive-well agents, and in several instances mob law was threatened. The result was an appeal to the courts, with the result as announced. If sustained by the Supreme Court, the farmers of the Northwest will have gained a signal victory over a hitherto most exacting monopoly.

At the recent hearing in Iowa, Judge Nelson, of the United States Circuit Court of Minnesota, and Judge Love, of the United States Circuit Court for the Northern District of Iowa, sat with Judge Shiras. Judge Love concurred in Judge Shiras's decision and Judge Nelson dissented. The appeal will not bring these cases before the Supreme Court of the United States for the first time. When the hearing in Iowa began, an appeal taken by the farmers from a decision made by Judge Gresham, of Indiana (now Postmaster-General), was pending in Washington, the case being that of Wahl *against* Hine. Only eight of the Supreme Court justices sat at the hearing of that appeal. The court was equally divided, four justices being on one side and four on the other, so that the Supreme Court must try again. An appeal from the New Jersey District will probably be reached before the appeal which will go up from Iowa. In the mean time, the patentee's application for an injunction prohibiting the Indiana farmers from using their wells has been denied. The conclusions of fact found by Judge Shiras are these: That Colonel Green, in 1861, being then in command of the Seventy-sixth Regiment of New York Infantry, put his method of driving wells into public use, for the benefit of his regiment, thereby abandoning his invention to the public; and that his invention was in open and public use, with his knowledge and acquiescence, for more than four years before he applied for a patent thereon. In these four years the public acquired rights through the open and uninterrupted use of the discovery. Judge Shiras holds that it necessarily follows from these conclusions of fact that both the original and reissued letters patent are invalid and void.

A NEW FIRE-PROOF MATERIAL.

The *Manufacturer and Builder* prints the following: Our attention has lately been drawn, by reason of some quite remarkable tests of its efficiency, to a new and, in many respects, novel fire-proof material, adapted to a great variety of uses, which is manufactured by the Magneso-Calcite Fire-Proof Company, of Boston, Mass. The company takes its name from that which it has adopted to describe its fire-proof composition. From the nature of the materials which it proposes to use, and its methods of applying them, we are not surprised to learn that the company has succeeded in producing a fire-proof material of decided merit.

Of the varied uses and applications of a material, thoroughly fire-resistant and susceptible of being produced in any shapes or forms that may be desired, quite an article might be written. But it will suffice for our purpose here to enumerate simply some of the more prominent of these. The most obvious and pressing need of a material that shall be thoroughly fire-proof is for the lining of safes and similar receptacles of various sizes and shapes intended for the preservation of money, bonds, deeds, important documents, diamonds, jewelry, and other valuables. In addition to the foregoing, there is a wide field of utility open for a heat-resisting material that can be adapted to miscellaneous uses in rendering buildings more secure against fire. Among these uses may be mentioned the lining of floors, shutters, partitions, elevator shafts and hallways, boiler rooms in mills, factories, steamboats, etc., and similar uses too numerous to mention. And it goes without saying, as the French put it, that a fire-proof material that is not too expensive, that is susceptible of being produced in such shapes and forms as to be applicable to all these and other uses, and that will answer its intended purpose efficiently, is an eminently useful material. Such a material, accomplishing not only all these objects, but many others not enumerated above, cheaply and effectively, the manufacturers of the so-called "magneso-calcite fire-proof material" claim to produce, and in substantiation of their claim present a very convincing array of testimony.

We prefer in our references to the material, however, to base our remarks on the character of the material itself, preferring to let this tell its own story. The so-called magneso-calcite material is prepared by treating finely fibrous asbestos, slag-wool, or other fibrous and incombustible materials, by suitable methods of impregnation, either wet or dry, with a cementing substance composed of a mixture of lime and magnesia (whence its name), and a silicate of soda, or its equivalent, and then subjecting the material in suitable forms to more or less pressure. The resulting product is a combination of non-combustible materials, which, when ready for use, takes the form of a hard board of any desired size and thickness, both sides of

which are covered with asbestos cloth. Any desired number of these boards are then joined together by a fire-proof cement of magneso-calcite and silicate, the whole forming both a heat-insulating and a fire-resisting body susceptible of the most diverse applications. As nothing but incombustible substances are employed as the basis of this product, the cementing material (magnesia and lime) being principally composed of the most refractory materials known to science, there can be no question that the product is thoroughly fire-resistant; and as these materials are at the same time excellent non-conductors of heat, the product must be to an eminent degree also an insulator of heat.

The company engaged in the manufacture of this product applies it to the construction of fire-proof receptacles of great variety, such as fire-proof safes and safety-boxes, express chests, bond, note, and jewelry cases, and the like, for which, in addition to economy of weight and space, it claims a very superior degree of protection. As an example, it specifies that one of its safes, standing 35 inches high and weighing only 650 pounds, corresponds in interior space with the ordinary cement-lined safe 45 inches high and weighing 1300 pounds.

In addition to the application of the material to the special branch of manufacture just mentioned, the company recommends, and is applying it, as a lining for vaults, shutters, partitions, elevator shafts, and hallways; for incasing boilers, fire-rooms in dwellings, stores, and steamboats; covering steam pipes, etc., for all of which uses its eminent fire-resisting and heat-insulating qualities, and its adaptalbiity to be readily produced in any desired or required form or shape, enable it to be used with advantage.

GEOLOGICAL NOMENCLATURE AND COLORING.

The following stratigraphical divisions have been provisionally adopted by the International Commission of the Geological Map of Europe. The colors placed against them are those proposed by the directors:

1. Gneiss and protogine. Bright rose-red.
2. Crystalline schists (mica-schists, talc and chlorite schists, amphibole schists, and foliated gneiss). Medium rose-red.
3. Phyllites (argillaceous schists, Urthon-schiefer). Pale rose-red.
4. Cambrian (all fossiliferous beds below the Llandeilo flags; primordial fauna, Taconic). Reddish gray.
5. Silurian, lower fauna (second of Barrande). Dark silk-green.
6. Silurian, upper fauna (third of Barrande). Light silk-green.
7. Devonian, lower. Dark green-brown.
8. Devonian, middle (limestone of the Eifel). Medium green-brown.
9. Devonian, upper. Light green-brown.
10. Carboniferous, lower (culm, mountain limestone, etc.). Blue-gray.
11. Carboniferous, upper (houllier, millstone-grit, etc.). Gray.
12. Permian (dyas), lower (Rothliegendes, etc.). Burnt sienna.
13. Permian (dyas), upper (Zechstein and equivalents). Sepia.
14. Trias, lower (grès bigarré). Dark violet.
15. Trias, middle (Muschelkalk). Medium violet.
16. Trias, upper (Keuper and equivalents). Light violet.

16'. *Rhetic*, provisionally (Hauptdolomit excluded).

17. Jurassic, lower (lias). Dark blue.
18. Jurassic, middle (Dogger, kellovien included). Medium blue.
19. Jurassic, upper (Malm with tithonic and Purbeck). Light blue.
20. Cretaceous, lower (Neocomien and Wealdian). Dark green.

20'. *Gault*, provisionally.

21. Cretaceous, upper (from the cenomanien). Light green.
22. Eocene (nummulitic, etc.). Orange-yellow.

22'. *Flysch*, provisionally.

23. Oligocene (with the aquitanien). Dark yellow.
24. Miocene (Mollasse). Medium yellow.
25. Pliocene. Light yellow.
26. Diluvium. Naples yellow.
27. Alluvium. White.

The subdivisions "Rhetic," "Gault," and "Flysch," whose affinities are doubtful, will be figured separately in the preparatory work, so that they can finally be joined either to the upper or lower formation, according to the decision reached by the commission of nomenclature.

MR. JOHN H. JONES, the official accountant, has published the following very interesting statement, showing the general distribution of anthracite coal in the year 1882:

	Tons.
To Pennsylvania, New York, and New Jersey	19,957,789
To New England States	5,064,775
To Western United States	2,213,107
To Southern States, including Delaware, Maryland, and the District of Columbia	1,168,730
To Pacific coast	49.065
To Dominion of Canada	616,875
To foreign ports	49,735
	29,120.076

It will be noted that as yet the Western business is comparatively unimportant, so far as the quantity shipped to that quarter is concerned. This year, however, we have every reason to believe will see a very notable increase; in fact, there must be, in order to keep the trade in other sections in a fair condition. It is questioned by many whether the East and South will take their regular quota due to the natural increase in consumption, roughly estimated at 5 per cent per annum, because the prospects for the iron trade and manufacturing generally are poor. The West will therefore have to take care of the tonnage thrown upon the market by the growing production, and upon the marketing of this surplus will depend to a considerable degree the future of the trade this year.

A SHAREHOLDER'S ANSWER TO A CALL.—The secretary of an Indian gold mine, having sent an imperative demand to a certain shareholder for the payment of a "call," received, says *St. Stephen's*, the following reply: "Dear Sir: I have your letter of this date, and note that your directors propose to proceed against me. Your prospectus stated that one of the objects of your company was to 'seek, win, and work gold in India and elsewhere.' Things not turning out well in India, your directors apparently consider it their duty to seek, win, and work gold 'elsewhere'—that is, out of me. I can assure you, however, that I am not in an auriferous vein; the only lode I possess is a load of debt, and as a gold mine I shall be a failure. Your prospectus estimated a yield of one ounce of gold per ton on thirty thousand tons of quartz crushed per annum—£10,500 sterling per annum. You may 'crush' me, but you will find that I will not yield nearly so much. My person (which, for the purposes of this calculation, may be considered quartz) weighs, roughly speaking, ten stone, and, if crushed immediately, I estimate that it would yield as under—Gold *nil*, silver 3s., copper 4½d.—total, 3s. 4½d. Deduct cost of crushing—say, £5 5s. Yours faithfully, ——."

FURNACE, MILL, AND FACTORY.

The stockholders of the Palmer, Mass., Wire Company have voted to increase the capital stock from $100,000 to $150.000, the original stockholders having the privilege to take the new at par. The company is overrun with orders, and the mill is busy night and day.

The Novelty Foundry Company, says the Youngstown (Ohio) *Register*, is the name of a new company which is engaged in perfecting an organization, and it is the intention to begin active operations the coming week. Among those engaged in the enterprise are Messrs. John Sampson, S. L. Clark, J. C. Brenneman, M. E. Rice, and F. W. Clark. The company is located on East Federal street, occupying property formerly held by Jones & Claypool. It proposes manufacturing all kinds of iron and brass castings, car-wheels, and coal-bank cars. Mr. M. E. Rice, a practical man of many years' experience, will be superintendent of the works.

On the 13th of June, the Gaylord Rolling-Mill at Portsmouth is to be sold at public sale. The Ashland (Ky.) *Independent* says that there is a movement on foot to procure its removal to that city, and it is among the probabilities that this will be done.

The Tod furnace, owned by the Brier Hill Iron and Coal Company, Ohio, which is relining, will be put in blast early in June, if the state of trade warrants it.

The sheet-iron department of the Ward mill, Ohio, at New Philadelphia, has been placed in operation. William E. Ward, of Niles, is manager of the new mill.

The Johnstown *Tribune* says: Mr. Frederick Krebs, Jr., Superintendent of the Gautier Steel-Works, has in his office a steel knot which will excite the admiration of the more intelligent and practical visitors at the Great Railroad Exposition, now opened at Chicago. The steel is round, and one inch and an eighth in diameter. To turn, twist, and tie it was no easy task. Mr. Benjamin Hinchman, one of Mr. Krebs's assistants, was given the work to do, and after some study he succeeded in rigging up a machine which took the rod and tied it into a very pretty knot, tightly drawn—the knot being seven or eight inches long and four or five inches through. This was a very severe test of the quality of the steel, but it stood it without the slightest crack appearing on its surface.

The *Bulletin* is informed that on the 17th of last month the Pennsylvania Steel Company's rail-mill made an unusually large run. During the twenty-four hours, 681 gross tons of 60-pound steel rails were rolled; and during twelve hours of the same day, 356 tons were rolled. The last turn of eight hours rolled 240 tons. The daily average for the week was over 614 tons. The average daily production of Bessemer steel ingots in the same week was 797 gross tons, while the largest twenty-four hours' run was 820 tons. One turn of twelve hours produced 458 tons of ingots.

The Dickson Manufacturing Company, of Scranton, has been awarded the contract to furnish the Calumet & Hecla Mining Company, of Lake Superior, Mich., with a steel boiler 90 inches in diameter, 36 feet in length, and to carry 150 pounds pressure. The total weight of this boiler will be 108,000 pounds, and the castings for it will weigh 10 tons. It will have 199 3-inch tubes. It is to be made of ¾-inch steel plate furnished by the mining company to the Dickson Manufacturing Company, after testing every plate prior to delivery. The boiler was designed by Mr. E. D. Leavitt, Jr., of Cambridgeport, Mass.

The Pennsylvania Graphite Works, at Byer's Station, on the Pickering Valley Railroad, owned by the Messrs. Young, of Reading, which have been standing idle for several months, are to be put in operation again about the 1st of June. The company disposed of its works some time ago, and since then they have been in litigation. Matters have now been settled, and the works will soon be put in operation.

At San José, the sheriff sold the Guadalupe quicksilver mine on the 8th inst., to satisfy the judgment recently obtained by Flood *et al.*, executors of the last will of William O'Brien, deceased, in the Superior Court. Sixteen thousand shares of the capital stock brought 3-1000 of a cent per share. The first parcel of land, containing 1109·67 acres, brought $100,000. The second parcel, containing 1032 acres, brought $25,000. Total purchase-money, $125,048. Marie Coleman was the purchaser. The sheriff's costs and commissions amount to $1299.98.

The large "coke-pusher," building at Scott Foundry, Reading, for Robert H. Powel, Powelton, is nearly finished, and temporary shedding has been erected in the yard of the works, under which the machinery is being put together. The coke-pusher will be operated by two engines. A blowing-engine for the Powelton Furnace is also building at the Scott Works.

The Colliau Furnace Company, of Detroit, has now about 100 of its cupolas at work. They are now used by the Michigan Car-Wheel Company, of Detroit; the Pullman Car-Wheel Company, of Pullman, Ill., and a number of other establishments.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY.

A dispatch from Tombstone, dated May 21st, says: The Copper Prince Mining Company has closed its case against the Copper Queen in the District Court. The defense will occupy most of the present week. Experts Rolker and Blake, of New York, are on the case. Copper Prince miners began to work on Copper Queen ground Saturday night, in order to prove the dip of the ledge, but were ejected by force of arms.

A dispatch dated May 24th, says that in the case of the Copper Prince against the Copper Queen Mining Company the jury gave a verdict for the plaintiff. A stay of proceedings for sixty days has been granted, pending a motion for a new trial.

The Copper Queen product for May will probably be about 350 tons of copper.

TOMBSTONE DISTRICT.

GIRARD.—Messrs. Disston and Lloyd, from Philadelphia, principal owners of this mine, are at Tombstone, preparing to start up work in the mine and mill again.

CALIFORNIA.

MONO COUNTY—BODIE DISTRICT.

BODIE CONSOLIDATED.—The official report for the week ended May 12th shows: Ore crushed, 163·44 tons; average assay value of pulp, $36.66 per ton; of tailings, $4.65. West cross-cut, 1000 level, is 226 feet long. North drift from east cross-cut, same level, is 116 feet long. North drift, 800 level, is in 446 feet. Winze No. 5 is 16 feet deep, and the vein in the bottom is somewhat better concentrated than where the winze was started. North drift from winze No. 6, 672 level, is 135 feet long, and south drift from same winze, at the 640 level, is 100 feet long.

STANDARD.—An accident at the mill May 17th completely ruined the engine. It will take a month to replace the engine. The Standard-Bulwer Mill is running regularly on Standard ore. A later dispatch says that a temporary engine is to be placed in the Standard mill, and crushing will be resumed within a week. For the week ended May 23d, 1203 tons of ore were extracted. The vein in the 1000 level is 2½ feet wide and looks well. The upper levels yield the usual quantity of ore. The Standard mill has resumed crushing.

CANADA.

PROVINCE OF MANITOBA.

BRITISH AMERICAN.—Miners are already engaged and are prepared to go to work as soon as navigation opens.

MANITOBA CONSOLIDATED.—Work is progressing favorably, but only a small force of men are at present employed.

RABBIT MOUNTAIN.—The stamp-mill will be in operation shortly. Operations at the mines are pushed vigorously.

NOVA SCOTIA.

OXFORD.—Mr. Frederick De Camp has been appointed general manager and superintendent of this company, whose properties are situated at East Chezzetcook. The company is now prospecting for another rich lode, of which there are indications in the locality of their present workings.

ONTARIO.

WALLB RIDGE.—Mr. William Coe, of Madoc, has purchased this hematite mine from the Bethlehem Iron Company.

COLORADO.

CLEAR CREEK COUNTY.

From the glowing reports received of the recent strike of carbonates on Lincoln Mountain, we learn that some of the ore is so rich in silver that pieces roasted in a camp-fire and allowed to cool were covered with fine silver globules. On the mountain, in places where trees had been blown down, large chunks of ore were exposed, which would weigh from three to forty pounds. In different places, it crops out of the ground two or three feet. About forty claims are taken up, all showing ore which seems to lie in strata, slanting with the surface of the mountain side. The elevation is about 9000 feet.

BLACK BEAR.—This tunnel has reached the depth of 170 feet. Mill-runs of this ore have been made, showing 600 ounces in silver, 1 ounce gold, and 4 per cent copper. There is now a pay-streak of 10 inches. It is the intention to continue the tunnel to 200 feet and then sink on the vein.

EAST HUKILL.—The mine has now reached 120 feet in depth, and shows a well-defined crevice 5 feet between walls, with a pay-streak of 16 inches. At a depth of 100 feet, levels are run east and west. Mill-runs of the ore give $70 in gold, $45 in silver, with 10 per cent in copper.

MAYFLOWER.—Draining the shaft has begun.

DOLORES COUNTY.

RICO REDUCTION COMPANY.—Repairs and improvements at the lixiviation works are making, and preparations for a season of increasing work are going on.

FREMONT COUNTY.

HUB.—Shipments have been made to Argo of ore which carried as high as seventy per cent copper and from forty to sixty ounces of silver to the ton. There is a large amount of ore now on the dump, and considerable will be shipped during the season. Machinery for the treatment of copper is understood to be on the way, and will be added to the plant of the Cañon City smelter. The mine is only eight miles from the Denver & Rio Grande Railroad and thirty-five miles from Cañon City.

LAND INVESTMENT, COAL AND OIL MINING COMPANY.—A report made to this company shows that the oil as taken from the well presents a uniform gravity of 30° Beaumé. Work on the well is rapidly pushed. The hole is enlarging to 8⅝ inches, and will be run to a depth of 1400 feet. The casing will be placed in position this week, and the tubing and pump next week. Pumping will be begun by the 25th, or at the latest by June.

GILPIN COUNTY.

GOMER.—Work has been resumed. Developments of the vein are made by drifting east from the main shaft at the depths of 60 and 100 feet.

RED CLOUD.—Preparations are making to start up this mine again.

ROLLINS.—The company will begin building a fifty-stamp mill very shortly. The mill will be connected with the Perigo and the company's other mines at Gold Dirt by a tramway three miles in length. The company thinks that the water-power there, available the year around, will more than compensate for the extra cost of transportation. There is ore enough in sight on the Perigo to run the new and the old mill for two years.

WYANDOTTE.—Parties are leasing on the Crawford County mine, the property of this company. Levels are driven both ways from the shaft and backstopes driven.

GUNNISON COUNTY.

MOFFATT SMELTER.—The proprietors are engaged in the construction of sufficient furnace capacity to handle all the ore that will be shipped to Gunnison. The owners say that if necessary they will double the capacity of the largest smelter in the State to accommodate the demands. By June 12th, this smelter will be in full blast. The Bartlett process of utilizing the fumes is used here.

OAKES.—This mine has been sold to Boston parties for $10,000. It is developed by a shaft eighty feet deep and a tunnel 360 feet long.

ROSE & REED.—Reports state that this concentrator will be running within two days.

LAKE COUNTY.

Late Leadville exchanges report the following:

The Hamburg, Lowland Chief, Grand Prize, Curran, and Chemung, all situated upon Breeze Hill, and adjoining the Highland Chief, have recently been consolidated. In the consolidation are Messrs. Tankersley, O'Connor, Billings, Beaudry, and Senator Plumb, of Kansas. This concentration of some of the most promising interests in or about the camp was the result probably of the litigation which has involved the owners for a long time, and which, of course, prevented them from proceeding with the development of their properties. The Hamburg and Curran both show an ordinary grade of mineral and are worked on a lease. The rest of the shafts are in a good contact, and machinery will be placed upon them at once, preparatory to an active campaign.

BROOKLAND.—The suit of the St. Bernard Mining Company against this company, for a temporary injunction, has been denied. Development-work has been resumed, and shipments will soon be commenced.

CLIMAX No. 6.—The lessees have opened up in two drifts in their uprise a body of iron about seven feet in thickness, which averages fifteen ounces in silver and from four to six per cent in lead. Above this iron are five feet of flint or carbonate, which is similar to that carrying the chlorides in the Dolphin and Lee. Both the iron and carbonate lie in the upper contact, between the wash and the porphyry, and are of the same nature as the iron in which the rich ore-bodies in the Montana shaft on the Climax have been found.

HARRISON REDUCTION-WORKS.—The rebuilding of the works, recently destroyed by fire, has been commenced. It is expected that the smelter will be in operation again within sixty days.

LITTLE CHIEF.—The central portion of the property has been leased. The royalty is said to be fifty-two per cent.

IRON SILVER.—Work on the Iron Hat, one of the properties of this company, which has lately been leased, has been commenced. The shaft is clearing up and getting in order. A body of ore eighteen inches thick, which carries sixty ounces silver and forty per cent lead, is exposed in the property.

SILVER CORD COMBINATION.—The report presented at the annual meeting shows the product and the operations of the company for the past year to have been as follows:

Tons of ore produced	34,873
Ounces of silver	561,057
Ounces of gold	3,216
Tons of lead	7,417
Total value of production	$1,009,187.06
Cost of mining	$308,673.75
Cost of smelting	329,406.98
Administration and handling	49,510.40
Total	$687,591.13
Gross profits	$321,595.93
From this amount deduct cost of improvements	14,346.95
Payment floating debt	4,377.23
Incidentals and purchase real estate	7,433 50
Payment outstanding bonds	169,625.00
Payment coupons on bonds	9,821.05
Total	$205,603.73
Cash in treasury April 1st	$115,992.20
Net profits for April	45,028.99
Balance on hand May 1st	$161,021.19
Dividend paid May 2d	90,000.00
Balance	$71,021.19

This shows a cash surplus now on hand of $71,021.19, besides the profits of the present month. The new opening in the mine, including drifts, levels, inclines, winzes, and uprises, shows a total of over 6100 feet. The following gentlemen were elected directors: J. B. Grant, T. S. Wood, B. Burchard, Charles T. Limberg, W. W. Weigley, Charles H. Gross, W. Mitchell McAllister, Robert C. Broadbent, and William A. Dripps.

STONEWALL JACKSON.—The face of the upper drift shows a body of chlorides and galena which has reached a maximum thickness of two feet. Contracts have been made with the Royal Gorge smelter, at Cañon City, and regular shipments will be made from now on. There are several large bodies of low-grade ore known to exist in the mine, and prospecting will be vigorously prosecuted.

SAGUACHE COUNTY.

ESPERANZA.—This mine, on Crystal Hill, is the first discovery of the district. The ore is a manganese, which carries large quantities of free gold. The vein is a fissure, from 12 to 15 feet wide, with side-walls of graphite and porphyry. The workings consist of a shaft 55 to 60 feet deep and an open cut at another place of 30 feet. The ore mill-runs from 5 to 20 ounces gold and from 20 to 100 ounces silver per ton. There are about fifty tons of ore sacked in the ore-houses awaiting shipment.

SUMMIT COUNTY.

COLORADO & NEW MEXICO.—This company has a claim on Mineral Hill, into which it has driven a tunnel 730 feet, and has struck a vein of very rich ore not over a foot in width, which assays high in silver.

GRAND VIEW.—This property, consisting of three claims, is developed by a 49-foot shaft. The ore assays 25 ounces silver and 73 per cent lead. These mines will be worked during the season, and ore will be shipped within a short time.

ROBINSON.—A reporter of the Leadville *Democrat* states that the mine is showing an improved condition. For the month of April, there were shipped ninety-two car-loads of ore. Considerable ore is mined from the seventh and eleventh levels and a small amount from the fifth. The ore from the bottom yielded over 35 ounces to the ton. The cost of transportation and treatment at Argo is $20.50 per ton. This yields, therefore, over mining, smelting, and hauling, from $12 to $15 per ton. The company receives thirty per cent of the smelter's returns, and Mr. Greer, the lessee, from the balance has to pay all expenses. The mine yielded a net profit last month of over $6000, and is now doing much better. Mr. Greer is experimenting by the dry process of concentration on these ores. He expects to ship during this month upward of 1000 tons of ore. The ore from the twelfth level down to the bottom of the lower levels is now all hoisted through the east shaft. The ore from the upper levels is taken out of the tunnel as heretofore. There are sixty-five men employed in the mine, and though there is considerable water coming into the mine, no trouble is anticipated or yet incurred in handling it. The new incline is rapidly driven, three shifts of eight hours each being employed. The incline progresses at the rate of two feet per day.

DAKOTA.

The recent floods, caused by the rain-storm and the melting of the snow which had fallen a few days before, damaged much property in and around Deadwood. Several mills along Deadwood Gulch were destroyed, and the damage to the mines, it is stated by a dispatch, can not be repaired for several weeks. The Homestake mine has nine feet of water over it, and all the mines in the neighborhood of Deadwood are shut down. The Garden Gate and South Bend are washed out, and most of the bridges through the country have been swept away. The total loss is reported to be very large.

CALEDONIA.—The superintendent reports for the week ended May 6th: Ore produced, 1025 tons; bullion shipped, 838 ounces. Winze advanced 10 feet; total, 118 feet; looks more encouraging as depth is attained. The stopes are looking fine.

FATHER DE SMET.—The superintendent's report from May 1st to May 8th shows ore extracted from the first, second, and third levels to be 1900 tons. Ore milled, 1950 tons. North end tunnel advanced 6 feet. Tunnel in 890 feet. Golden Gate north header advanced 6 feet. Header in 100 feet.

The superintendent writes, under date of May 14th, as follows: Herewith express company's receipt for Bar No. 158 = 914 ounces gold, the result of run of mill for last half of April. In the beginning of April we began to work in open cuts, supposing the weather would be favorable for such work; but instead of fine weather, we have had more snow than for any month of the year, consequently we have been compelled to get ore from any point where it could be mined the easiest. Every thing about the mine and mill is running well, and we shall do better in May than we did in April. We have some very coarse screens coming from Chicago, which I want to use as soon as the weather is favorable for handling ore cheaply.

NEW YORK & PROVIDENCE.—This mining, milling, and smelting company, recently organized under the laws of the State of New York, with a capital of $200,000, has taken possession of some valuable mining property in the Black Hills, Pactola District. The company owns the May Queen, Black Hawk Nos. 1 and 2, Mammoth, and the Rob Roy. All these claims show up a large body of low-grade ore which can be milled at a profit.

MEXICO.

The Cusihuiriachic Mining Company has ordered of the Rankin, Brayton & Co., Pacific Iron-Works, San Francisco, a 60-inch Howell-White chloridizing furnace, to be delivered on the cars in twenty-one days from the date of order.

According to the Mexican *Financier*, the famous iron deposit in Durango, better known as the Iron Mountain, is about to be systematically worked by a strong American company. The syndicate is composed of Judge Helferstein, of New York, as president, with Governor Francisco Paricio, of Durango, Joseph Knotts, of Iowa, MacManus & Sons, of Chihuahua, and others as associates. It is purposed to erect machinery capable of an output of 300 tons per week, consisting of blast-furnaces, a complete foundry, etc. The mountain is situated a few miles from the city of Durango. An English company has been working a portion of the mountain, but in a limited and unsatisfactory way.

The work on La Estrella and Alta Gracia mines, Pachuca, is pushing. Prospects are reported bright. San Sebastian looks well. The lode is about 2½ yards wide, and the present run of metal assays about $5 to the ton.

BOSTON & MEXICO OIL COMPANY.—This company is the original or pioneer syndicate formed to work the oil-wells at Chapopote, near Tuxpam. The well is down 675 feet, and is progressing at the rate of eight feet daily.

GUADALUPE HACIENDA.—A report read at a recent meeting showed expenditures to date of $200,000.

ROSARIO.—The small steam-engine recently erected is rapidly draining the mine, revealing, as the water is lowered, rich metal, assaying $61 to the ton. The value of the property has rapidly risen.

SANTA GERTRUDIS.—This company, which is reported as about to sink a new perpendicular shaft, is sending its high-grade ore to England for reduction.

SANTA RITA.—A large pump has been put on this mine, to drain it of the heavy accumulation of water. This mine, in the time of the Spaniards, was constantly worked and yielded rich returns, and great expectations are raised that the unwatering will reveal a bonanza.

SENORA CONSOLIDATED MILL AND MINING COMPANY.—From a statement recently published, we take the following: This company was incorporated in 1880, under the laws of the State of New York. Its object was to acquire the titles to four mines situated in Northern Sonora, Mexico, in the Altar District, at the base of the Sombretillo Mountains, about 120 miles south from Tucson, Ariz., and about ten miles from the dividing line between Mexico and Arizona. These mines consist of the Puertesitos, Barrenos, Cumbre, and El Tio. Each mine represents a full mining claim of 2660 feet in length by 666 feet in width. The Puertesitos, Barrenos, Cumbre, and El Tio mines were obtained with perfect title, the boundaries being set up by government officers, and possession given by the official under the laws of Mexico in whom is vested this power. The titles to these mines are therefore perfect. Owing to the death of Mr. Milton S. Latham, the president and principal stockholder of the company, some fifteen months ago, the mines have been badly managed, and work has been suspended for the past year. The difficulties which have heretofore been a ban and impediment to the successful carrying on of the business of the Sonora Consolidated Mill and Mining Company have at last been removed, and the officers of the company present the gratifying intelligence to the stockholders that Mr. Dudley Hoyt, the well-known mining superintendent, has been employed to take charge of the company's property, and is now on his way to the mines to start the mills and proceed to place the mines on a paying basis. Mr. Hoyt has received instructions to make a full report on the mines and what the probabilities are for the future, and publish the same for the benefit of all the stockholders. An official telegram from him, dated May 16th, says that he has examined the company's mines in Sonora. The property is valuable, the ore high grade, and a large amount in sight.

MICHIGAN.

Following is a statement of the iron shipments from the ports of Escanaba, Marquette, and L'Anse from the opening of navigation to Wednesday, May 16th, 1883:

MARQUETTE RANGE.

Mines.	Tons.	Mines.	Tons.
Barnum	1,192	Pittsburg & Lake Superior	1,043
Cambria	1,826	Lake Superior	1,347
Cleveland	509		
Cleveland hematite	2,171	Total	11,054
Jackson	2,466		

MENOMINEE RANGE.

Chapin	13,649	Quinnesec	2,200
Commonwealth	1,868	Vulcan	4,044
Cyclops	1,143	Great Western	1,068
Florence	1,103	Paint River	546
Hewitt	922	Union	144
Ludington	7,486		
Metropolitan	4,947	Total	44,951
Norway	4,441		
Perkins	1,365	Grand total	56,005

MONTANA.

BELL.—Extensive operations will be commenced as soon as the new shaft is connected with the old workings and ore can be hoisted in sufficient quantity to supply both furnaces at the smelter. Among other important improvements which will greatly facilitate the handling of ore, is a tramway running under the calcining furnace, connecting with an elevator and elevated tramway, by which the cars can be filled with ore from the furnaces and transported directly to the blast-furnaces. The calcining furnaces have been doing some extraordinary work during the past week, each furnace averaging ten and a half tons of ore per day, which was calcined down to less than five per cent sulphur. Twenty-one tons of ore are run through the single blast-furnace each day, which produces a daily matte output of about ten tons. At the mine, work on the new three-compartment shaft is steadily progressing. At the depth of 400 feet, a cross-cut will be run to a point beneath the old workings, with which connection will be made by an uprise. It is expected that this connection will be made within the next thirty days, when stoping will be commenced on the high-grade west vein, and from 40 to 60 tons per day hoisted, to supply both blasts of the smelter, the output of which will then be increased to from 20 to 30 tons of matte per day.

GRANITE MOUNTAIN.—One thousand tons of No. 1 ore have been shipped to St. Louis for reduction. The product of the mine is an ordinary sulphuret ore, containing some ruby and antimonial silver. It is stated by one of the owners that it is cheaper to ship to St. Louis than to Butte.

NEVADA.

The Pawling (N. Y.) Smelting and Mining Company is now erecting at Battle Mountain, Nev., a ten-ton galena plant from the Pacific Iron-Works, Rankin, Brayton & Co., San Francisco. This will open a new era for that portion of Nevada, as it has long been in need of proper reduction facilities. The whole business is under the charge of Mr. Frank Green, an old-time miner, who has had an extended experience.

ALBION.—According to the Eureka *Sentinel*, the tributers are taking out some good ore at the head of the cave. They have a vein about three feet wide, and and are working in open ground. On the fissure-drift, where a streak of ore was cut, ten feet of a winze has developed a three-foot vein still widening in depth, having maintained the width of three feet after the first foot sunk. This ore is of good grade. At the head of a cave to the north of the east uprise, a vein of good ore has been found by tributers. This also is opening out, and shows quantity and strength, and gives promise of continuing in exploration, this being new ground and on the line of the fissure. Under the June chamber, a drift has been run, developing a cave in which ore of good grade and quantity is found, and appearing to make as it pitches in depth.

ALEXANDER.—The company has men fitting up one of the hoisting-works. Operations at the mine will be resumed shortly.

BERRYMANN TUNNEL.—Work continues at this tunnel, Silverado Mountains, satisfactorily. Good progress is made.

EUREKA TUNNEL.—The engine shaft has reached a depth of 119 feet. At 105 feet it connects with the No. 3 drift on the first level. The No. 2 winze is connected with the South Addison chamber at the bottom. This chamber is 12 feet high, 16 feet wide, and 20 feet long. The ore is striking northerly. Four feet of this ore are very rich. Progress is made in uprising on the North Addison ore-body, which is also looking well. The carbonate seam is not looking as well as it did, yet the ore output has not decreased on account of this. In fact, since the connections mentioned above were made, the output has increased, and expenses have been lessened.

GOLDEN RULE.—Progress is made on this tunnel and the prospects are improving rapidly. A few days ago, a vein of quartz six inches thick was cut through.

OLD CHAMPION.—This mine, on Alhambra Hill, has been twice relocated, and will now be worked again. A tunnel will be started and run on the contact of the limestone and trachyte, from which a cross-cut will be driven in under the old workings upon the ledge. There is some good ore in sight.

NEW MEXICO.

The machinery for a four-stack smelter to be built by Gustave Billing has arrived and will be at once placed in position at Socorro. Mr. Billing is the owner of the Kelly mine, which contains a large body of carbonates.

A dispatch dated Santa Fé, May 22d, says that an armed mob of sixty men attacked the principal mine of the San Pedro and Cañon del Agua Company, in Santa Fé County, and drove off thirty men who were working the mine. The mine has been in litigation some time, and legal action will be taken to gain possession of it.

The new owners of the Cooney mine, in the Mogollon Mountains have, ordered of the Pacific Iron-Works, Rankin, Brayton & Co., San Francisco, a complete ten-stamp silver mill, which will be erected without delay, to work the rich ores of that property.

UTAH.

BEAVER COUNTY.

Reports from various mines show that the Stalwart, formerly the Ivanhoe, of the Garden City Company's group, has a fine showing of rich horn-silver at a depth of 180 feet. The Kanairab, in South Camp, Star District, over 200 feet perpendicular, has a fine showing of first-class smelting ores. The Monmouth and St. Mary's, two of the oldest claims in Star District, have developed large bodies of free smelting ores. The Dykes & Morehouse, in West Camp, has also a good showing of heavy silver-lead ores of a high grade, at a depth of 200 feet. The Creedmoor, South Camp, has a four-foot vein of rich galena ore. In North Star, the Lake Superior shows a very large body of copper ore, which runs from 20 to 60 per cent copper, and contains from 20 to 150 ounces silver per ton. This is at a depth of nearly 200 feet perpendicular. Star District also contains a number of claims which have immense deposits of low-grade silver-lead ores, which will run from 14 to 22 ounces silver, and from 12 to 25 per cent lead per ton. These ores can be hauled to Milford for $2 per ton or less, where plenty of water can be had for concentrating purposes. Machinery now at the latter place is lying idle that can be used for such purposes.

WASHINGTON COUNTY—SILVER REEF.

The mining industry, which is the creative feature with us, writes the Silver Reef correspondent of the Salt Lake *Tribune*, looks decidedly encouraging for the future. Some of the properties which have lain idle for a year or more have resumed, or are about to resume operations, and there is no doubt but that the latter half of the year will witness more mines in operation and more men employed in the district than at any time during the past three years.

WYOMING.

BULLION.—This mine, situated in Sweetwater County, has been sold in Salt Lake City to San Francisco parties for $60,000. The ledge has been stripped 150 feet in length and eighty feet wide, exposing a large body of free-milling gold ore, which assays favorably. A shaft thirty-two feet deep in the ore has a drift at the bottom extending thirty-six feet north, and the heading is still in ore. A sixty-stamp mill will be at once erected on the property by the purchasers.

FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, May 25.

The mining market has been quite active this week, and stronger prices have prevailed for the better class of stocks. The Comstocks show quite an improvement both in price and in dealings, closing strong to-day. Sonora Consolidated continues to be the most active stock on the market, and the reported transactions have been enormous. Another "short interest" has been developed in it, and this has sent the stock up to a strong figure. A summary of the market is given below. The total number of mining shares sold at all the Exchanges for the week aggregates 326,346, as against 237,700 last week.

The Comstock shares have been active and strong. California sold from 22@30c., with a business of 4500 shares. Consolidated Virginia has had a fair business at strong prices; it sold from 52@66@61c. Sierra Nevada was also strong, selling from $5.38@$6.63. Union Consolidated shows quite an improvement in price, under a fair business; it sold from $4.60@$6.50. Mexican was quiet and steady at $3.15@$3.50. Gould & Curry sold at $3@$3.25 under a small business. Hale & Norcross had a small business at strong prices; it sold from $4.50@$5.25. Best & Belcher sold at $4.50. Yellow Jacket was quiet at $4.25@$4. Sutro Tunnel was active and steady, selling from 20@22c., with a business of 18,400 shares. Consolidated Imperial sold at 10c., assessment paid, and at 4c., assessment unpaid.

The Leadville stocks were quiet and steady. Amie sold to the extent of 29,500 shares at 15@18c. Chrysolite was quiet and steady at $1.10@$1.15. Iron Silver had a fair business at steady prices; it sold from $3.10@$3. Leadville was strong under small transactions, and sold from 48@60c. Little Pittsburg was irregular at 85@75@80c. under a small business. Climax sold at 9c.

The Bodie stocks were also quiet and steady. Bodie had a small business at steady prices, selling from $1.20@$1.15. Standard was moderately dealt in and was a little strong; it sold from $6@$6.38. Bulwer sold at 50c. to-day.

The Tuscarora stocks have been a little weak under small transactions. Argenta sold from $1.20@$1.10, with a business of 300 shares. Belle Isle was quiet and steady at 25c. Navajo had a fair business and was weak; it sold from $1.95@$1.70. North Belle Isle sold at 23c., with one transaction. Independence sold at 32c. Elko Consolidated was quiet and steady, selling from 24@20c., assessment paid, and at 3c., assessment unpaid.

In the miscellaneous list, Alice was quiet and steady at $3. Bassick sold from $8.25@$8.13 under a small business. Eureka Consolidated was steady at $3@$3.25. Father de Smet sold from $4.50@$4.10. Green Mountain was quiet and weak at 81@75c. Rising Sun sold at 3c., and Cherokee at 3c. Homestake records a small business, and was a little weak; it sold from $16.25@$15.63. Horn-Silver had a fair business at irregular prices; it sold from $6.75@6.25@$6.63. Hukill sold at 7c. under a small business. Northern Belle was quiet and weak, selling from $6.75@$6. Robinson Consolidated had a small business at irregular prices; it sold from 86@81@83c. Sierra Grande has gained strength, under a moderate business, and has sold from $1.10@$1.45@$1.30.

Bradshaw was quiet at 33c. Central Arizona sold from 30@25c., under a business of 200 shares. Decatur was active and steady, selling from 5@6c. Eastern Oregon sold at 28c. Harlem had a small business and was strong, selling from $1.40@$1.55. Hortense sold at 12c. Lacrosse was moderately dealt in and was steady; it sold from 9@13@12c. Oriental & Miller records a small business at 15c. Rappahannock sold at 8@7c. Sonora Consolidated was very actively dealt in at strong prices; it sold from 47@70c., the transactions amounting to 182,214 shares. South Hite sold at 15c., and South Pacific at 6@7c.

Dispatches to the representatives of the Copper Prince report that this company has won its suit against the Copper Queen Company. The latter has made a motion for a new trial.

MEETINGS.

Amygdaloid Mining Company, office M. H. Hoffman, No. 629 Walnut street, Room 7, Philadelphia, Pa. Annual meeting of stockholders and election of trustees, June 6th, at twelve o'clock M.

Empire Copper Company, office M. H. Hoffman, No. 629 Walnut street, Room 7, Philadelphia, Pa. Annual meeting of stockholders and election of trustees, June 1st, at twelve o'clock M.

Old Dominion Copper Mining Company, No. 72 Broadway, New York City. The postponed annual meeting of stockholders, June 29th, at twelve o'clock M.

Philadelphia & Boston Mining Company, office M. H. Hoffman, 629 Walnut street, Room 7, Philadelphia, Pa. Annual meeting of stockholders and election of trustees, June 1st, at twelve o'clock M.

Quincy Mining Company, No. 4 Exchange Court, New York City. Annual meeting of stockholders and election of trustees, June 6th, at twelve o'clock M.

Sonora Consolidated Mill and Mining Company, No. 40 Broadway, Room 46, New York City. A meeting at which a full report of the financial condition of the company and the plans for the future will be discussed, May 29th, at one o'clock P.M.

Union Consolidated Mining Company, Astor House, New York City. Annual meeting of stockholders and election of trustees, June 4th, at twelve o'clock M.

Union Copper, Land and Mining Company, No. 3 Merchants' Exchange, State street, Boston, Mass. Meeting of stockholders, May 29th, at three o'clock P.M.

DIVIDENDS.

The Catalpa Mining Company has declared a dividend of ten cents per share, payable to stockholders of record June 1st.

The Charleston Mining and Manufacturing Company of South Carolina announces a quarterly dividend of two dollars and fifty cents per share, payable June 1st, at the office of the company, No. 132 Walnut street, Philadelphia, Pa.

The Crescent Mining Company, of Utah, has declared a dividend of ten cents per share, payable May 20th.

The Gem Mining Company, of Colorado, has declared a dividend (No. 14) of two per cent on its capital stock, payable to stockholders of record May 28th.

The Glen Mining Company, of Colorado, has declared a dividend (No. 7) of one per cent on its capital stock, payable to stockholders of record May 28th.

The Granite Silver Mining Company, of Colorado, has declared a dividend (No. 5) of one per cent on its capital stock, payable to stockholders of record May 28th.

The Iron Silver Mining Company, of Colorado, has declared dividend No. 11 of twenty cents per share, or $100,000, payable June 15th. The total amount of dividends to date, $1,100,000.

PIPE LINE CERTIFICATES.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

		Opening.	Highest.	Lowest.	Closing.	Sales.
May	19....	$1.03⅜	$1.03¼	$1.02⅜	$1.02⅜	1,230,000
	21....	1.03	1.03⅞	1.02½	1.03⅜	1,844,000
	22....	1.03⅝	1.04½	1.03½	1.03⅜	1,615,000
	23....	1.03¼	1.03¼	1.00⅝	1.00⅝	1,482,000
	24....	1.00⅝	1.03¼	1.00¾	1.03¼	1,694,000
	25....	1.03⅝	1.04⅛	1.02½	1.03⅜	1,520,000
Total sales.						9,385,000

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, May 24.

There is no improvement to note in regard to the market for copper stocks. The sales of the past week have been few and far between, and prices are barely sustained. Lake ingot copper is quite firm at about 16 cents; but, unless an advance from this point is made, we do not anticipate any activity in the market. The sales of Calumet & Hecla have ranged from $234@$232½, the latter being to-day's price. Very little stock has changed hands, and there is no pressure to sell, holders generally being well contented with the liberal dividends which come along quarterly. Quincy is dull, but steady in price at $43, with a few shares sold at $43¼. Osceola dropped to $20 on a sale of 150 shares; but small lots sold at $21. Pewabic declined from $5 (May 10th) to $3, which is, however, bid for it. The above comprises all the stocks dealt in during the week, and affords but little margin for comment.

In silver stocks, the principal feature was the spurt in Sullivan, of Maine, which advanced from $1¼@$2⅛, with a reaction to $1 1-16, closing, however, to day, with sales at $1⅛. The advance is attributed to the report of the discovery of a new and rich orebody, and also to the fact that shipments of ore to England are to be commenced at once, they having received and accepted an offer of $18 per ton net for the ore on hand, which is reported as 50 or 60 cargoes now on the dump. We give the rumor as we hear it; but we confess to but little faith in its truthfulness. It looks to us more like a stock operation, as we understand the stock is largely held by a few parties, who would be glad to dispose of their holdings to the public. Catalpa declined in the early dealings to 62½c., and advanced to 70c. The company has declared a dividend of 10 cents per share, payable June 15th. Crescent sold at 30c. Bonanza, 2 1-16c. San Pedro declined to 40c.

At the Mining Exchange, a fair amount of transactions is reported. Bowman Silver seems to be the most active stock at present, and steadily gains in price, advancing from 15@19c. Massachusetts & New Mexicois steady at 7@8c. Empire, firm at 22c. Massachusetts & New Mexico 6s advanced to $28.

3 P.M.—The market was as dull as ever this afternoon, without change of prices. Sullivan sold at $1⅞. Calumet & Hecla, $232½. Harshaw, 50c. Closing prices: Silver stocks: Catalpa, 67½@70c. Crescent, 25c. bid. Harshaw, $½@$⅝. Sullivan, $1¾@$1⅞. Silvet Islet, $3@$4. San Pedro, 35@40c. Copper stocks: Calumet & Hecla, $232@$232½ asked. Franklin, $10 bid, $17 asked. Huron, $1⅝ asked. Osceola, $21 bid. Pewabic, $3 bid, $4 asked. Quincy, $44 bid, $45 asked.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. May 18.	May 19.	May 21.	May 22.	May 23.	May 24.
Albion	....	....	....	....	....	....
Alpha	1⅝	1⅝	1¾	1¾	1⅞	2
Alta	.60	.60	.60	.65	.65	.75
Bechtel	....	....	....	....	....	....
Belcher	1	1⅛	1⅛	1⅜	1½	1½
Belle Isle	.25	.30	....	.25	....	.20
Best & Belcher	4	4⅛	4¼	4½	4	4¾
Bodie	1⅛	1	1⅛	1	1⅛	1⅛
Bullion	....	....	....	....	....	....
California	.25	.25	.25	.25	.25	.30
Chollar	2¾	2¾	3	3¼	3⅛	3¾
Con. Virginia	.50	.50	.55	.60	.55	.60
Crown Point	1¼	1⅜	1½	1¾	1½	1⅜
Elko Cons	....	....	....	....	.20	.25
Eureka Cons	2¾	2⅞	....	3	3	3
Exchequer	.35	.35	.38⅝	.40	.40	.40
Gould & Curry	2½	2¾	3	3	3	3¼
Grand Prize	.85	.90	.90	1	1	.70
Hale & Norcross	4¾	5	6⅞	6¾	6⅞	8
Independence	.35	.35	....	.30	.25	.30
Martin White	....	.30	....	.30	.30	....
Mexican	3¼	3¼	3½	4	3⅝	3⅞
Mono	....	....	....	....	....	....
Mount Diablo	....	....	....	....	....	....
Navajo	2	2	2	2	1⅞	1¾
Northern Belle	6⅛	....	6⅛	6	5⅞	6
North Belle Isle	.25	.20	.25	....	....	....
Ophir	2¼	2¼	2⅜	2¾	2⅜	2¾
Overman	....	....	....	....	....	....
Potosi	1¼	1⅜	1⅜	1¾	1¼	1⅜
Savage	2¼	2⅜	2⅜	2¾	2⅜	2⅝
Scorpion	....	....	....	....	....	....
Sierra Nevada	5⅜	5⅜	5⅝	6¼	6¼	6⅝
Silver King	....	10½	....	....	....	10⅞
Tip-Top	.40	....	....	....	....	....
Union Cons	4¾	4⅞	5⅜	6⅜	6¼	6¼
Wales Cons	....	....	....	....	....	....
Yellow Jacket	3¾	4	4¼	4⅛	4¼	4⅜

The following are the financial balances of the various mining companies on May 1st:

CASH ON HAND.

Alta	$12,912.45	Gould & Curry	$21,414.79
Argenta	6,632.75	Hale & Norcross	31,800.64
Albion Con	651.53	Melones Con.	67,964.45
Andes	6,791.00	Mono	4,119.35
Bodie Con	24,281.31	†Mexican	46,851.55
Bechtel	1,613.64	Jackson	1,085.85
Bulwer	9,621.08	Ophir	11,833.71
Booker	416.63	Occidental	6,680.09
Bentcu Con	3,987.41	Sierra Nevada	10,436.13
Best & Belcher	601.99	Summit	1,717.34
*Belcher	11,479.00	Silver Hill	3,024 64
Crown Point	21,489.67	Scorpion	754.24
Challenge Con	3,187.03	Savage	33,720.93
Con. Virginia	52,824.34	Standard	121,392.28
California	31,405.33	Tioga	957.95
Day	5,519.85	Utah	3,941.77
Double Standard	49.30	Union	16,491.19

INDEBTEDNESS.

‡Albion Con		Lady Washington	$1,690.16
Con. Imperial	$1,281.44	Martin White	6.041.90
Grand Prize	7,187.84	McClinton	130.10

* Due Sutro Tunnel, $10,920.
† Bullion on hand, assay value $3939.23.
‡ Exact amount not yet known; approximates from $260,000 to $275,000.

BULLION MARKET.

NEW YORK, Friday Evening, May 25.

The London market has shown a little more strength the past week, and this, with a higher sterling rate, has advanced the price here; but the week closes without any special indications.

DATE.	London Pence.	N. Y. Cents.	DATE.	London Pence.	N. Y. Cents.
May 19	50 1-16	109¾	May 23	50⅛	109⅝
21	50 1-16	109⅛	24.	50⅛	109⅝
22	50 1-16	109⅝	25.	50⅛	109⅝

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended May 25th, as compiled from various sources, amounted to $133,000, as against $149,000 reported for the previous week. The receipts from January 1st, 1883, to date are $5,118,713.53.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended May 19th	$48,395
Corresponding week last year	4,675,000
Since January 1st, 1883	5,546,137
Corresponding period last year	25,894,297

Imports.

Week ended May 19th	$110,382
Corresponding week last year	112,6 0
Since January 1st, 1883	6,652,408
Corresponding period last year	1,629,532

BULLION PRODUCTION FOR 1883.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1883.

The shipments of silver bullion are valued at $1.29·29 per ounce troy; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.11 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 14⅛ per cent, to arrive at actual value.

MINES.	States.	Month of April.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont	$86,226	$320,419
*Alta-Montana, G. L. S.	"	.....	$10,625
*Belmont	"	5,171	17,775
Bodie, G. S.	Cal	25,085	91,342
Bodie Tunnel, G.	"	10,470	45,319
*Bonanza King, G.	"	57,000	199,077
*Boston & Montana, G.	Mont	18,741	72,318
*Central Arizona, S.	Ariz	.....	35,845
*Christy, S.	Utah	24,249	92,654
*Chrysolite, S. L.	Colo	24,146	142,238
*Contention, S.	Ariz	.....	209,260
Crescent, G.	Cal	.....	13,000
*Custer, G. S.	Idaho	.....	43,572
*Deadwood-Terra, G.	Dak	.....	120,231
*Derbec Blue Gravel, G. S.	Cal	10,041	31,844
*Father de Smet, G.	Dak	26,596	127,985
*Frisco M. and S. Co., G. S. L.	Utah	16,366	$77,084
*Head Center Cons.	Ariz	6,865	6,865
*Head Center and Tranquillity	Ariz.	13,893	18,486
*Hecla Cons., G. S.	Mont	$57,060	234,984
*Homestake, G.	Dak.	.....	330,060
*Hope, S.	Mont	.....	20,574
Horn-Silver, S. L.	Utah	291,000	1,055,000
*Independence, G. S.	Nev	7,779	34,722
*Kentuck, G.	"	2,100	8,237
*Lexington, S.	Mont	96,317	421,204
*Little Pittsburg, S. L.	Colo	9,296	22,873
*Marguerite, G.	Cal	.....	33,200
*Martin White, G. S.	Nev	.....	136,317
*Moulton, G. S.	Mont	.....	123,288
Mount Diablo	Nev	65,221	75,078
*Navajo, G. S.	"	69,646	281,626
*North Belle Isle	"	1,953	1,953
Northern Belle, S.	"	75,700	343,015
*Ontario, S. L.	Utah	222,274	807,695
*Oxford, G.	N. S.	6,181	21,324
*Phœnix, G.	S. C.	.....	43,606
*Pinal Cons., S. L.	Ariz	37,388	137,860
*Satemo, G.	N. S.	.....	2,500
*Silver Bow, G. S.	Mont	29,433	101,241
Standard, G.	Cal	108,477	371,483
Star, S.	Nev	.....	27,095
*Stormont, S.	Utah	19,677	74,281
Syndicate, G.	Cal	4,869	14,086
Tintic M. and M. Co.	Utah	.....	7,632
*Tip Top, S.	Ariz	.....	‡22,983
*Tombstone, G. S.	"	53,071	‡246,230
Yellow Jacket, S.	Nev	54,120	152,873
Total amount of shipments to date			$6,879,318

* Official. † Net value. ‡ Assay value. § Not including value of lead. *G.* Gold. *S.* Silver. *L.* Lead.

Foreign Bank Statements.—The governors of the Bank of England, at their regular weekly meeting, made no change in the bank's minimum rate for discount, and it remains at 4 per cent. During the week, the bank gained £273,000 bullion on balance, and the proportion of its reserve to its liabilities was raised from 32⅜ to 35⅛ per cent, against 42 7-16 per cent at this date last year. May 23d, the bank gained £19,000 bullion on balance. The weekly statement of the Bank of France shows gains of 3,300,000 francs gold, and 1,775,000 francs silver.

METALS.

NEW YORK, Friday Evening, May 25.

Copper.—To-day the first arrival of copper from the Lake are reported. As yet the quantities are small, and are probably sold. There is very little offering, and the market continues quite firm at 16c., though little is done at that figure. It appears that consumers are again beginning to turn their attention to other brands, and those of standard quality are firmly held. Outside brands are a little better, cheap lots having disappeared. We quote 14¼@15½c. for the range.

London cables a little lower, £62 f. o. b. for Chili Bars and £68 f. o. b. for Best Selected. Mail advices indicate that the reports of shipments of furnace material and ores from this side were made use of by bears to a considerable extent. The following statement of March imports and exports of copper and ores, etc., will prove of interest:

IMPORTS.

	March		9 months	
Quantities.	1883.	1882.	1883.	1882.
Ores ton	2,348	2,566	19,986	3,099
Pig and old, lbs.	14,794	29,613	273,596	643,078
Quantities.	EXPORTS.			
Ore, tons	318	10	2,561	659
Pig, etc, lbs	1,059,139	685	3,246,324	2,288,796
Values.				
Ore	$84,929	$550	$414,889	$50,485
Pig, etc	155,171	145	531,746	377,184

According to the Board of Trade returns, the imports and exports of copper for the first four months were:

	Jan. 1 to April 30. 1883. Tons.	1882. Tons.	1881. Tons.
Imports:			
Pure in pyrites	5,951	5,650	4,753
" precipitate	7,261	5,253	7,193
" ore	4,036	3,862	3,434
" regulus	2,830	2,910	1,216
Bars, cakes, etc	1,667	10,136	9,594
	31,745	27,811	26,190
Exports:			
Raw (English)	5,954	3,398	5,694
Sheets	5,472	4,739	4,485
Yellow metal at 60 per cent	3,670	3,343	2,935
Brass at 70 per cent	1,066	999	988
	16,162	12,479	14,102
Foreign	3,072	3,915	3,099
	19,234	16,385	17,201

Lead.—Beyond the sale of about 400 tons of Common lead in lots at 4·40c., we have heard of no business, and the market continues dull, especially so for Refined lead.

From St. Louis, Messrs. John Wahl & Co. wire us as follows to-day:

There is no change of any description in our market. Business has been quiet and of a limited character, with quotations at 4·12½@4·15c. for Refined and 4·12½c. for Chemical lead.

From Chicago, Messrs. Everett & Post, telegraph us: There has been no change in the condition of our market. Sales aggregate 300 tons of Common and Refined, on the basis of 4·15@4·17c. here.

It is necessary to add to the above dispatches of our correspondents that railroad freights have been cut and are now 28 cents from Chicago, and 30 cents per 100 pounds from St. Louis.

Tin.—This metal has been weaker, with spot Straits quoted at 21·50c. Australian, 21·50@21¾c.; and Billiton at 22c. London cables £96 at the close.

Spelter.—This metal continues dull, but tolerably firm, at 4·70@4·75c. here for Common Western.

Antimony.—We have no change to note.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, May 25.

The following are the British Board of Trade returns of exports to the United States for the first four months of the current year:

	1882.	1883.
Pig-iron	154,951	86,927
Old iron for re-manufacture	40,972	17,936
Steel unwrought	66,766	15,305
Tin plates	64,976	65,239
Hoops and sheets	8,874	8,885
Bar, angle, bolt, and rod	10,081	4,692
Railroad iron of all kinds	89,965	21,098

American Pig.—Yesterday and to-day there have been many rumors that the Allentown Iron Company has failed. So far as we can learn, the facts in the case are the following: A few days since, the directors of the Allentown Iron Company called a meeting of its shareholders, and placed before them a proposal to raise additional capital—$1,000,000, it is said. This did not meet with any favor, and the principal bondholder, Mr. J. Welsh, of Philadelphia, decided to foreclose and wind up the concern. We understand that the furnace property will be offered for sale. The company has been losing money steadily, and its plant, so far as the furnaces at the Allentown Iron-Works are concerned, is so antiquated that it can not compete, and can make money only when the demand exceeds the capacity of the other furnaces of the district. Four of the furnaces were built in 1846, 1853, and 1854, and are small. The only modern furnace, 17-foot bosh and 60 feet high, was put up in 1874. It is the only one likely to survive. It is likely that the furnaces will blow out at an early date, and as there is little stock of pig on hand, the closing out of the Allentown Company is likely to have rather a good effect.

The market continues dull. The Thomas Iron Company reports sales of 1000 tons of Nos. 1 and 2 Foundry at $20 and $22 respectively. There is still talk of a further decline, and ordinary brands are selling below $22 and $20. We quote $21@$22 for No. 1, and $19@$20 for No. 2. A sale of 3000 tons of Gray Forge at Hoboken at $19.25 is reported, but other sales have been made at much lower figures. We quote $17.50@$19 at tidewater. Nothing is doing in Bessemer pig, which is quoted $21@$22 at tidewater. Spiegeleisen is moving steadily at $31.50 @$32.50, for 20 per cent material.

Scotch Pig—Business is dull. The arrivals are light, aggregating 800 tons, of which only a portion was sold to arrive. Freights continue firm, while the foreign markets are dull and a little lower. We quote, ex ship: Coltness, $24@$24.50; Glengarnock, $22@$22.50; Eglinton, $21@$21.50; Langloan, $23.50@$24; and Summerlee, $24@$24.50.

Steel Rails.—The Eastern mills are all well supplied with orders till the fall, and some of them are declining orders. Inquiries, chiefly for small lots, are quite numerous, and can be placed at $28 at mill.

Old Rails.—There is very little business to report. The market is dull and weak, with Ts nominally quoted $22.50@$23.

Scrap is very flat, No. 1 being quoted ex ship at $23.50@$24, with little demand.

Philadelphia. May 25.

Pig-Iron.—To-day's quotations for pig-iron are as follows: Standard No. 1, $22; No. 2, $20; Forge, $19@$20. The week's business has been trifling. Most of the foundry iron sold has been at 50 cents below these quotations. A great deal of ordinary Foundry has been offered, and unusual concessions have been made, but buyers decline to accept. Founders are short of stocks, and, notwithstanding low prices and concessions, decline to purchase except for present needs. This policy helps to maintain a large apparent surplus on the market. Buyers are apprehensive.

The Western situation is unimproved. Extremely low prices for pig-iron prevail there, and the effect is felt in the East. Forge iron is selling in a small way, at prices ranging from $17.50@$18.50, but the highest limits are very hard to reach. Car-load lots were bought this week under $18 at furnace. The standard makes seem to be held pretty firmly, but some buyers have even obtained concessions from quoted rates. Very little will be done until after June 1st in anticipating requirements, as the trade has not yet given up the hope of a compromise of some sort. Should affairs not take a favorable turn by that time, a good many furnaces, the number of which has been variously estimated, will blow out; in fact, there is no other remedy for the situation.

Furnace Irons.—Very little business has been heard of in furnace irons. A small trade in Scotch has been kept up, and prices have declined 50 cents within a few days. English is dull. Bessemer would sell at $21.

Merchant Iron.—The local iron trade is without any special points. Manufacturers are taking in a good many orders, sufficient to cover present output, at 2·20c., and stores report a moderate demand in small lots at 2·25@2·30c. The purchase of iron is controlled

NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	May 19.		May 21.		May 22.		May 23.		May 24.		May 25.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon.							3.00		3.00				200
Amie Con., Co.	.18	.15	.16				.18	.16			.19	.17	29,530
Argenta, Ne.	1.20	1.10											300
Bar. & Walker, Ut.													
Bassick, Co.	8.25						8.25	8.13					400
Belle Isle, Ne.									.25		.25		300
Bodie Cons., Ca.									1.20	1.15	1 15		720
Breece, Co.													
Bulwer, Ca.											.50		300
California, Ne.	.22				.26	.23	.25		.27	.25	.30		4,500
Cal. & Hecla, Mich.													
Carbonate Hill													
Caribou Con., Co.													
Chrysolite, Co.	1.10				1.15	1.10	1.15	1.10	1.15	1.10			4,100
Cons. Va., Ne.	.53	.52	.56	.55	.66	.62	.65	.62	.61	.58			5,333
Crown Point													
Deadwood-Terra, Dk.													
Dunkin, Co.													
Eureka Cons., Ne.	3.00		3.25										150
Excelsior, Ca.													
Father de Smet, Dk.					4.50						4 25	4.10	275
Findley, Ga.							.04						3,300
Gold Stripe, Ca.													
Gould & Curry, Ne.			3.00				3.25						200
Grand Prize, Ne.													
Great Eastern, Dk.	.02				.02								5,100
Green Mountain, Ca.					.81				.75		.75		500
Hale & Norcross, Ne.	4.50		5.25										400
Hall-Anderson, N. S													
Hibernia, Co.													
Homestake, Dk.	16.25	16.00	15.63								6.75	6.63	225
Horn-Silver, Ut.	6 50		6.75	6.50	6.50	6.25	6.50	6.25					1,650
Hukill, Co.	.07				.07								1,050
Independence, Ne.									32				100
Iron Silver, Co.	3.05	3.00	3.10	3.06	3.10		3.05	3.00	3.00		3.00		5,400
La Plata, Co.													
Leadville C., Co.					.50	.48	.60		.60				652
Little Chief, Co.											.47		500
Little Pittsburg, Co.	.85								.75		.80		400
Marsin White, Ne.													
Moose, Co.													
Navajo, Ne.	1.95	1.85	1.80	1.75	1.75	1.70	1.85	1.75	1.80	1.70			5,700
Northern Belle, Ne.			6.75	6.50					6.00				200
North Belle Isle, Ne.									.23				100
Ontario, Ut.	24.00												200
Ophir, Ne.													
Plumas, Ca.													
Prussian, Colo.													
Quicksilver Pref., Ca.													
" Com., Ca.									8.00				100
Rising Sun, Ca.			.03										100
Robinson Cons., Co.	.86	.85	.84	.81	.81		.83	.82	.83				7,500
Savage, Ne.													
Sierra Grande, N. M.	1.10				1.10				1.45	1.40	1.35	1.30	1,700
Sierra Nevada, Ne.	6.00		5 38		6.00	5.75	6.63	6 38					915
Silver King, Ar.									10.88				10
Spring Valley, Ca.													
Standard, Ca.	6.13	6.00	6.00		6.00		6.25	6.13	6.38	6.25			535
Stormont, Ut.													
Tip Top, Ar.													
Tombstone, Ar.													
Vizina, Ar.													
Yellow Jacket			4.25				4.00						2 0

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	May 19.		May 21.		May 22.		May 23.		May 24.		May 25.		
	H	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Advance.								.40					100
Albion								.60					100
Alta													
Alta-Montana, g.													
Am. Flag, s.													
Barcelona, g.													
Bear Creek													
Bechtel Con., g.													
Belvidere													
Best & B'licher, g. s.					4.50								100
Big Pittsburg, s. t.													
Bondholder													
Bradshaw, s.							.33						200
Buckeye													
" pref.													
Bull-Domingo, s. l.													
Bye and Bye													
Calaveras, g.													
C'lav'r's W. & M. Co.													
Cal., S. H., g.													
Central Ariz'na, s.						.39	.25						200
Cherokee, g.							.03						500
Climax, Co.	.09												400
Cons. Imp'ri'l, g. s.							.04				.10	.04	3,000
Crowell, g.													
Dahlonega, g.													
Decatur	.05		.05		.06	.05					.06		17,700
Dunderberg													
Durango, g.											.06		200
Eastern Oregon			.28										100
Elko Cons.			.24	.21	.23	.22					.20	.03	5,300
Enterprise													
Fannie Barret													
Globe Copper													
Gold Placer, g.													
Goodshaw, g.													
Granville, g.													
Harlem M. & M. Co.	1.45										1.45		1.55	1.40	1,400
Hortense, s.													200
Lacrosse, g.	.13	.09	13		.13	12	.13					.13	.12	4,900
Lucerne													
Mariposa Pref. g.													
" Com., g.													
Mexican, g. s.	3.25	3.15			3.50								250
Miner Boy													
Mono													
North Standard, g.													
N. Horn-Silv'r, s. t.													
Ori'nt'l & Miller, s.	.15										.15		2,550
Quartz Creek													
Rappahannock, g.			.08	.07									1,800
Red Elephant, s.													
Ruby, of Arizona													
Silver Cliff, s.	.52	.47	.56	.52	.62	.55	.65	.62	65	.64	.70	.63	182,214
South Bodie, g.													
South Bulwer, g.													
South Hite			.15										100
South Pacific			.06		.06						.07	.06	3,000
State Line, 1 & 4, s.													
" Nos. 2 & 3, s.													
Sutro Tunnel	.20		.20		.21	.16	.21	.20	.21		.22	.21	18,400
Taylor Plumas													
Umatilla, s.													
Union Cons., g. s.	4.60		4.60		5.25	5 13	6.25	6 00	6.50				1,270

Full tables giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 83,812. Non-dividend shares sold, 243,534.

BOSTON MINING STOCKS.

	May 18.		May 19.		May 21.		May 22.		May 23.		May 24.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Aliquez													
Amie													
Atlantic													
Aztec													
Bodie Con.													
Bonanza D.	2.06¼		2.13				2.15		2.25	2.13	2.13		600
Bowman Sil	.16		.16		.17	.16	.17	.16	.19	.18	.19		16,200
Bruns. Ant.													
Bulwer													
California					.20								200
Cal. & Hec.	234	233			233	232			233		232½		37
Catalpa	.65	.60	.70		.72½	.70	.70	.67½	.70	.67½	.70		5,625
Central Ariz													
Cherryfield													
Co. Virginia			.51				.55						1,000
Copper F'lls													
Copperop													
Crescent	.30				.30								450
"Cust"							1.63						200
Decatur													
Deer Isle													
Denver City													
Douglas							.87½		.95				150
Duncan													
Dunkin													
Empire	.23								.22		.22		400
Eureka Con.	3.65												50
Franklin	10.13												12
Hancock G.													
Harshaw											.50		25
Huron													
Independ'ce													
Indian Q'n.											1.30		100
Mammoth													
Mass. & N.M.	.08				.08		.08		.08		.07		7,400
Milton													
Napa													
National													
North. Belle							6.63						25
Ontario					24.00								15
Osceola	21.00		20.00		21.00				21.00				188
Penn-Breck													
Pewable	4.00						3.00						75
Pine Tree													
Plymouth	.17								.16		.16		1,900
Quincy	43.00				43.50				43.50				80
Ridge													
Robinson													
San Pedro					41				.40		.42		800
S'ra Nevada	4.55												100
S'ra Grande													
Silver Islet													
Silver King			11.00										15
Simpson Gd													
So. Pacific									.06				200
Standard											.13		20
Sullivan					2.13	1.50	1.75	1.63	1.88	1.70	1.88		5,760
Sutro Tun.							.21		.20		.21		1,100
Sycamore													
Twin Lead.	.05								.06	.05	.08	.06	6,800
Vizina													

PHILADELPHIA MINING STOCKS.

	May 18.		May 19.		May 21.		May 22.		May 23.		May 24.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L	
Argent			.16				.17		.16				1,400
Battle Mt.			.03										2,500
Black Sul.													
Bodie													
Buena	.02				.02				.02				3,000
California													
Calista													
Chrysolite	1.10				1.10						1.15		3,200
Cincinnati	.12		.12		.12								5,000
Comprom'e			.24		.25		.24				.22		20,200
Contention			3.75										400
Con. Virg.			.50										100
Dauntless					.01								2,000
Del Monte	.03												500
Denver City			.17		.16				.15				5,200
Eureka													
Girard	.09		.09		.09		.08		.09		.08		16,200
Golconda													
Governor	.09	.08	.09	.08					.08		.07		10,275
Grand Uni'n	.21		.20				.16		.14				9,000
Gunnison	.90		.92½		.90		.92½	.90	.92½		.90		7,600
Homestake													
Horn Silver													
Iowa Gulch	.07		.06		.07				.07	.06	.08		25,050
Iron Silver	2.95	2.90					3.05		3.10		3.05		3,850
King Bul'on													
Ledger Con.													
Little Dia'd.													
Little Matd								.06					4,350
Little Pitts.					.85								500
L'g & D'y H.													
Montana													
Mt. Sheridan									.04				1,000
Navajo											1.80		750
North'n B'l.													
Orion			.04						.05				1,600
Orion Pref.													
Palmetto E.							.01				.01		5,200
Pembina							.15						400
Penn-Breck.	.11		.11		.12		.12	.11					8,300
Permanent							.03	.02	.02		.03		4,500
Pizarro													
Pizarro Ex.			.02								.03		5,300
Potosi													
Rara Avis	.35		.35		.37½		.37½		.40	.37½	.40		2,900
Rara Avis E.	.12		.12		.12		.13	.12	.13	.12	.13		49,400
Record													
Rico Pion'r.													
Robinson			.85		.85		.85						7,000
San Pedro													
Sierra G'nde	1.05	1.02½	1.05		1.05	1.02½	1.05		1.27½	1.05	1.50	1.35	24,500
Sierra Nev.							5.38						500
Silver Cord.			1.85		1.80								800
Silver King.													
Silv'r Plume													
Sovereign													
Standard													
Sultana					.04		.04	.03			.04		1,000
Sutro Tun'l.	.20										.21		400
Tombstone									.75		.75		200
Victor			.02						.02				4,000
Yale Mt.											.04		1,000

to a great extent by the opinions of the respective buyers as to the summer supply. Some few large consumers have placed requirements for sixty days; others are buying from two to four weeks ahead. There is, in general, a little more business going on.

Nails.—Nail-makers have sold for June and July deliveries in some cases. The retail trade is good, and small lots are going at from $3.15@$3.25. Large lots, up to car-load lots, are selling as low as $3. Stocks are moderate and prices well maintained.

In *Construction Iron*, very little that has not been said heretofore is to be added. Large orders are hard to get, and in the little business of that character that is on the market prices are badly demoralized. Angle iron is quoted nominally at 2·40c. Inferior iron has been sold at 2·25c. Channels and Beams, combination prices, 3·50c., less 12½ per cent. Plate iron can not be sold outside of small lots at 2·40c. Sheet and Flange unchanged.

Steel Rails are in active request. Two or three large orders have been placed at $38. A fair amount of business in a small way is coming to hand at $39@$41, according to weight of sections. Old material is without activity. Small shipments are offered at $23@$27. Scrap is weak at $23@$26.

Pittsburg. May 24.

Pig-Iron.—The situation in this city has changed for the worse, weak holders of pig-iron have taken fright, and large offers have been made at very low prices. Consumers decline to purchase beyond immediate requirements. Red-short and neutral iron have been offered at $17@$18; foundry iron, at $19@$21. A sale took place on Tuesday of a portion of the Marshall iron, and it is believed that all of the immense stock of 60,000 tons will find its way into the market in the course of a few months. The effect will be disastrous, especially if the anticipated strike should take place. Stocks are already very large, and nothing but a very general closing down will prevent further weakness; buyers of finished iron have taken alarm, and are endeavoring to cover future requirements at present rates, namely, 2c. For several days past, a large amount of business has come to hand. Consumers have been running very bare of stock since winter. Nails continue active and firm at $3@$3.25. Inquiries are in hand for summer deliveries. Bessemer pig is offered at $21.50. Discounts on gas and steam-pipe, 70 and 5; on boiler tubes, 55 and 5. On large orders there are heavier discounts. Oil-well casings, 50c. per foot. Tubing, 16c.

Merchant Steel is weak and dull. Consumers are carrying very light stocks. Steel rails are firm at $39@$40. Mills in this section are well supplied with business. Rail fastenings are 2·60c. for spikes; 2c. for splice bars; hexagon nuts, 3·35c.

Prices for Old Rails have declined from $26@$22.50; occasional transactions, 50 cents under. Crop ends are offered at 25c., but better prices are looked for. The general situation is favorable to manufacturing interests. Mail and telegraphic advices from Western iron centers show large supplies and moderate demand. A number of mills will probably continue in operation during the summer with non-union labor. At the present time, retail requirements are large. Steel for agricultural implements is in large supply, and buyers are waiting for a further decline. Steel mills at this point continue to work to full capacity, and will probably continue to do so through the summer.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, May 25.

Anthracite.

The trade has improved a little since our last, inquiries for season delivery becoming more numerous, and spot lots of stove coal are realizing better prices. On the whole, however, the situation continues to be exceedingly discouraging to middle-men, who often cut off their commission in order to retain their trade, while individual operators are shading prices a little more than usual, although the companies appear to be doing little in that way. It is urged that the latter have more than ever reasons to stand together firmly. The Western trade has fairly begun, though scarcity of vessels at Buffalo temporarily checks the movement.

Mr. John H. Jones, official accountant, has just published the following statement of the anthracite coal tonnage for March:

	April, 1883.	For year 1883.	For year 1882.	Difference.
Phila. & Reading RR.	578,518	2,055,660	1,778,745	I. 276,915
Lehigh Valley RR.	*493,517	1,835,543	1,577,836	I. 257,708
Central RR. of N. J.	413,796	1,364,669	1,150,899	I. 213,771
Del., Lack. & W. RR.	392,778	1,410,798	1,222,952	I. 187,845
Del. & Hud. Canal Co.	†267,163	977,549	879,728	I. 97,821
Penna. RR.	219,792	735,688	627,685	I. 108,003
Penna. Coal Co.	119,991	418,888	368,363	I. 50,525
N. Y., L. E. & W. RR	26,155	102,126	70,507	I. 31,659
Total	2,511,710	8,900,961	7,676,715	I. 1,224,247

* This amount includes the production of the mines of the State Line and Sullivan RR. Co., amounting to 5352 tons.

† In addition there were 39,615 tons transported from mines by D. & H. C. Co., during April, which is included in tonnage of other interests.

The stock of coal on hand at tide-water shipping points, April 30th, 1883, was 719,232 tons; on March 31st, 1883, 598,192 tons; increase, 121,040 tons.

Bituminous.

The trade is dull, and there is considerable talk of low offerings of coal. Rumors of low prices of Cumberland at Baltimore and of Clearfield at Philadelphia are numerous, and we have every reason to believe are not entirely without foundation. Current business is small, and strong efforts are made for what there is of it. There is a strike of the coal-heavers at Georgetown and a scarcity of vessels. It is stated, however, that there is an understanding among the shippers that no more than $1.50 will be paid to Boston. We quote Clearfield alongside at $4@$4.25; and Cumberland, $4.10@$4.35, according to quality.

STATISTICS OF COAL PRODUCTION.

Comparative statement of the production of anthracite coal for the week ended May 19th and year from January 1st:

TONS OF 2240 LBS.	1883. Week.	1883. Year.	1882. Week.	1882. Year.
Wyoming Region.				
D. & H. Canal Co.	101,767	1,305,546	81,678	1,127,125
D. L. & W. RR. Co.	108,665	1,630,458	96,488	1,443,673
Penna. Coal Co.	33 015	448,885	33,113	390,481
L. V. RR. Co.	45,880	396,232	44,401	379,689
P. & N. Y. RR. Co.	5,185	72,113	5,488	69,660
C. RR. of N. J.	52,883	875,232	52,330	797,267
Penna. Canal Co.	15,292	79,989	14,008	85,913
North & West Br. RR.	7,493	182,157	.....	.....
	370,180	4,990,612	327,506	4,293,808
Lehigh Region.				
L. V. RR. Co.	131,915	1,718,550	133,362	1,562,659
C. RR. of N. J.	52,092	800,479	45,713	718,090
S. H. & W. B. RR.	1,418	16,571	.....	15,000
	185,425	2,535,600	179,075	2,295,747
Schuylkill Region.				
P. & R. RR. Co.	177,409	2,380,922	158,408	2,173,570
Shamokin & Lykens Val.	30,557	483,020	25,858	396,432
	207,966	2,863,942	184,266	2,570,002
Sullivan Region.				
St Line & Sul. RR. Co.	1,369	22,588	790	19,047
Total	764,940	10,412,742	691,637	9,178,604
Increase	.....	1,234,138	.....	.....
Decrease	.....	.....	.....	.....

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Total same time in	1878	5,121,427 tons
" " "	1879	8,632,714 "
" " "	1880	7,939,037 "
" " "	1881	9,322,027 "

The increase in shipments of Cumberland Coal over the Cumberland Branch and Cumberland & Pennsylvania railroads amounts to 167,384 tons, as compared with the corresponding period in 1882.

Belvidere-Delaware Railroad Report for the week ended May 19th:

	Week.	Year. 1883.	Year. *1882.
Coal for shipment at Coal Port (Trenton)	4,638	25,825	15,324
Coal for shipment at South Amboy	17,906	318,593	290,179
Coal for distribution	13,864	301,705	262,006
Coal for company's use	2,477	55,386	50,299
Total	28,885	701,509	617,808
Increase	.....	83,701	.....
Decrease	.....	.....	.....

The Production of Bituminous Coal for the week ended May 19th was as follows:
Tons of 2000 lbs., unless otherwise designated.

	Week. Tons.	Year. Tons.
Cumberland Region, Md.		
Tons of 2240 lbs.	53,655	784,841
Barclay Region, Pa.		
Barclay RR., tons of 2240 lbs.	6,421	130,397
Broad Top Region, Pa.		
Huntingdon & Broad Top RR.	3,367	79,289
East Broad Top	443	20,977
Clearfield Region, Pa.		
Snow Shoe	4,323	96,659
Tyrone and Clearfield	58,525	1,057,838
Alleghany Region, Pa.		
Pennsylvania RR.	7,087	183,574
Pittsburg Region, Pa.		
West Penn RR.	4,854	181,586
Southwest Penn. RR.	2,423	46,571
Penn & Westmoreland gas-coal, Pa. RR	24,262	528,996
Pennsylvania RR.	1,503	184,787
Total	166,803	3,294,615

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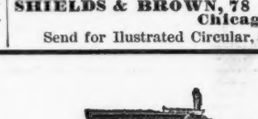

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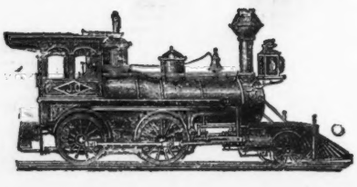
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